The Refrigeration Service Engineer

Vol. 5
No. 6

JUNE • 1937

THE JOHN CRERAR
JUN 16 1937
LIBRARY

Refrigerant and Oil Data • Rebuilding
Hermetics • Electronics for Servicemen •
Air Conditioning • Questions and Answers

HURRY

Stock up!

Meet that hurried call with a genuine ROTARY SEAL replacement unit and your reputation is made

ROTARY SEALS must PERFORM SATISFACTORILY.
Your customer MUST BE SATISFIED.
No guess work—no delay—no complicated mechanism to adjust. It is the easiest to install.
No reliable service man can afford to be without ROTARY SEAL replacement units.
Positive profits—positive satisfaction—positive service.

Rotary Seal Replacement Units are fully covered by U. S. and foreign patents.

KF 1505—A New Replacement Unit for Kelvinator and Frigidaire Compressors.
Is offered you service men at the surprisingly low price of $1.50, list. It does the work, because it's built to do it!
Stock up with ROTARY SEALS—Get them from your nearest jobber.

ROTARY SEAL COMPANY
805 W. Madison St.
CHICAGO, ILL.

Clean AS A WHISTLE!

Wolverine Seamless Copper Refrigeration Tubing is MADE CLEAN . . . SEALED CLEAN . . . and DELIVERED CLEAN. It's a pleasure to work with this dependable, high quality product.

Every step in its manufacture is time-proved, to give you the best tubing for your job. The walls of Wolverine deoxidized, dehydrated seamless Copper Refrigeration Tubing measure a **full** .035 (20 Stubs gauge). 99.9% pure electrolytic copper and a bright annealing process are used to make this tubing uniformly soft for easier bending, cutting and flaring.

Made to A. S. T. M. specifications

ASK YOUR JOBBER

He carries a complete stock of Wolverine Copper Tubing for Refrigeration and Air-Conditioning.

WOLVERINE TUBE COMPANY

1411 CENTRAL AVE. DETROIT, MICH.

Only ALCO

MAKES GENUINE DIAPHRAGM TYPE

THERMO VALVES

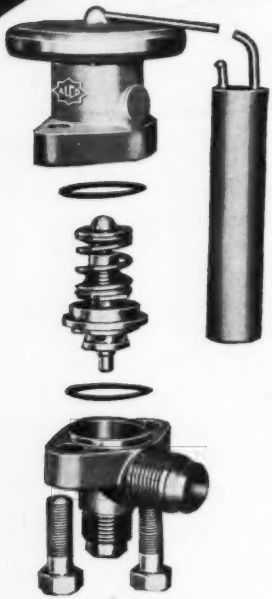


Illustration showing complete assembly of Alco Type "TL" Thermo Valve. Note the simplicity of the three component parts.

- ***Easy to service***
- ***Dependable operation***
- ***Simple to install***

ALCO Series "T" Thermo Valves have but three component parts: power assembly, cage assembly, and body flange. There are no working parts in the body flange, and it is never necessary to break the line connections to service the valve. The entire valve is assembled by only two cap screws, making servicing a particularly simple process.

Series "T" Thermo Valves accurately and dependably control liquid flow at low superheat over a wide range without flooding. Their performance effectively reduces cycling or hunting to a negligible minimum. Alco Series "T" Thermo Valves are available in a variety of capacities which permits close selection to meet all evaporator requirements.

Write for Bulletin No. 150 which gives complete installation and service data for "T" Series Thermo Valves for Freon, Methyl Chloride and Sulphur Dioxide.

ALCO VALVE CO., INC.
2630 Big Bend Blvd., St. Louis, Mo.

ANACONDA COPPER REFRIGERATOR TUBES

are Unusually SOFT

....Easy to bend and flare

Anaconda Copper Refrigerator Tubes have exactly the qualities you need to give the best value in installation jobs.

These quality tubes are *exceptionally soft.* They lend themselves to easy bending and may be *flared without cracking.* They are thoroughly dehydrated to free them from moisture on the inside and the ends are sealed to keep them dry. And, even though they are made of 99.9% pure copper, they are specially deoxidized to increase their corrosion-resistance.

Anaconda Copper Refrigerator Tubes are manufactured according to A. S. T. M. specification B68-33 by methods which assure *unusually bright, clean inside surfaces.* They come to you absolutely free from chips and dirt.

Anaconda Copper Refrigerator Tubes meet leading manufacturers' specifications for tubes to be used in installation work. They are carried in stock by leading Refrigerator Parts Distributors.

Anaconda Copper Refrigerator Tubes are wrapped in moisture-resistant paper which protects the finish of the tube.

26419A

Cutaway view of inside of tube. The inside surface is bright and clean—no dirt, no chips.

ANACONDA
from mine to consumer

FRENCH SMALL TUBE *Branch*

THE AMERICAN BRASS COMPANY · *General Offices:* WATERBURY, CONNECTICUT

Jobbers with Local Stocks

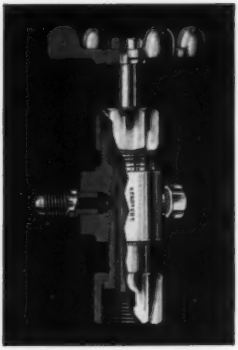
Albany, N. Y.	Hoy & Co.
Allentown, Pa.	General Refrigeration Supply Co.
Atlanta, Ga.	J. M. Tull Metal & Supply Co., Inc.
Baltimore, Md.	Clendenin Bros., Inc.
Baltimore, Md.	Melchior, Armstrong, Dessau Co.
Binghamton, N. Y.	Service Supply Co.
Boston, Mass.	A. E. Borden Co.
Bridgeport, Conn.	Parsons Bros.
Brooklyn, N.Y.	Coleman Electrical Supply Co., Inc.
Brooklyn, N.Y.	Melchior, Armstrong, Dessau Co.
Buffalo, N.Y.	Root, Neal & Co.
Cambridge, Mass.	Melchior, Armstrong, Dessau Co.
Charlotte, N. C.	Henry V. Dick Co.
Chicago, Ill.	H. W. Blythe Co.
Chicago, Ill.	Max A. R. Matthews
Chicago, Ill.	Borg-Warner Service Parts Co.
Chicago, Ill.	Refrigeration Equip. & Supply Co.
Chicago, Ill.	Fred C. Kramer Co.
Chicago, Ill.	H. Channon Co.
Chicago, Ill.	Automatic Heating & Cooling Supply Co.
Cincinnati, Ohio	The Merkel Bros. Co.
Cincinnati, Ohio	Williams & Co., Inc.
Cleveland, Ohio	Williams & Co., Inc.
Columbus, Ohio	The Justus & Parker Co.
Dallas, Texas	The Electromotive Co.
Davenport, Iowa	Republic Electric Co.
Dayton, Ohio	The W. H. Kiefaber Co.
Denver, Colo.	Auto Equipment Co.
Detroit, Mich.	J. M. Operr, Inc.
Detroit, Mich.	Borg-Warner Service Parts Co.
El Paso, Texas	Zork Hardware Co.
Fargo, N. D.	Fargo Foundry Co.
Flint, Mich.	Shand Radio Specialties
Fort Wayne, Ind.	H. J. Schroeder Co.
Ft. Worth, Tex.	McKinley Refrigeration Supply Co.
Greensboro, N. C.	Home Appliance Service Co.
Harrisburg, Pa.	Melchior, Armstrong, Dessau Co.
Hartford, Conn.	Melchior, Armstrong, Dessau Co.
Hempstead, Long Island, N.Y.	Isid Harvey, Inc.
Honolulu, T. H.	Theo. H. Davies & Co., Ltd.
Houston, Texas	D. C. Lingo Co.
Houston, Texas	Walter Refrigeration Supply Co.
Indianapolis, Ind.	F. H. Langenkamp Co.
Jackson, Miss.	Enochs Sales Co.
Jacksonville, Fla.	Jamita Company
Kansas City, Mo.	Forslund Pump & Machinery Co.
Knoxville, Tenn.	Leinart Engineering Company
La Crosse, Wis.	W. A. Roosevelt Co.
London, Ont., Canada	Refrigeration Supplies Co., Ltd.
Long Beach, Calif.	L. B. Marsh
Los Angeles, Calif.	Refrigeration Service, Inc.
Lubbock, Texas	R. & R. Parts & Supply Co., Inc.
Macon, Ga.	Lowe Electric Co.
Madison, Wis.	Gustav A. Larson Co.
Memphis, Tenn.	United Refrigerator Supply Co.
Miami, Fla.	Bailey-Milam, Inc.
Milwaukee, Wis.	Chase Brass & Copper Co., Inc.
Milwaukee, Wis.	Refrigeration Specialty Co.
Minneapolis, Minn.	Chase Brass & Copper Co., Inc.
Minneapolis, Minn.	Refrigeration & Industrial Supply Co., Inc.
Montreal, Quebec, Canada	Railway & Engineering Specialties, Ltd.
Newark, N. J.	T. W. Binder Co.
New Orleans, La.	Enochs Sales Co.
New Orleans, La.	The Spangler Co.
New York, N. Y.	Aetna Supply Co.
New York, N. Y.	Melchior, Armstrong, Dessau Co., Inc.
New York, N. Y.	Paramount Electrical Supply Co.
Norfolk, Va.	Noland Co., Inc.
Oakland, Calif.	Pacific Tool & Supply Co.
Oklahoma City, Okla.	Mideke Supply Co.
Omaha, Nebraska	United Supply Co.
Peoria, Ill.	Wilkins Pipe & Supply Co.
Pittsburgh, Pa.	Williams & Co., Inc.
Philadelphia, Pa.	Melchior, Armstrong, Dessau Co., Inc.
Portland, Ore.	Bill Hieber, 526 S. W. Wash.
Providence, R. I.	Rhode Island Supply & Eng. Co.
Roanoke, Va.	Noland Company, Inc.
Rochester, N. Y.	Ontario Metal Supply, Inc.
Rochester, N. Y.	Melchior, Armstrong, Dessau Co., Inc.
Rockford, Ill.	Gustave A. Larson
St. Joseph, Mo.	Bristol Supply Co.
St. Louis, Mo.	The Spangler Co.
Salt Lake City, Utah	Pacific Utah Co.
San Antonio, Texas	Straus-Frank Co.
San Francisco, Calif.	California Refrigerator Co.
Sacramento, Calif.	J. N. Blair Co.
San Juan, Puerto Rico	Refrigeration Supply Co.
Seattle, Wash.	Refrigerative Supply, Inc.
Sioux City, Iowa	National Refrigeration Service
South Bend, Ind.	The South Bend Supply Co.
Springfield, Ill.	United States Electric Co.
Springfield, Mass.	C. P. Pierson Co.
Syracuse, N. Y.	Syracuse Equipment Corporation
Toledo, Ohio	The Heat & Power Engineering Co.
Toronto, Ont., Canada	Railway & Engineering Specialties, Ltd.
Tulsa, Okla.	Machine Tool & Supply Co.
Vancouver, B. C., Canada	Fleck Bros., Ltd.
Washington, D. C.	Refrigeration Supply Co.
Waterloo, Iowa	Winterbottom Supply Co.
White Plains, N. Y.	County Seat Plumbing Supply Co., Inc.
Wilkes Barre, Pa.	Radio Service Co.
Winnipeg, Manitoba, Canada	Railway & Engineering Specialties, Ltd.
Worcester, Mass.	Standard Supply Co.

Factory Representatives

Atlanta, Ga.	W. A. Siegfried
Chicago, Ill.	O. C. Taylor
Dallas, Texas	C. E. Boren
Dayton, Ohio	E. J. Kimm
Denver, Colo.	R. L. Chambers
Detroit, Mich.	T. F. Wilson
Los Angeles, Calif.	Van D. Clothier
New York, N. Y.	K. M. Newcum
Omaha, Neb.	Austin Jones
St. Louis, Mo.	G. R. Postlewait
San Francisco, Calif.	A. W. V. Johnson

General Export Representatives

Melchior, Armstrong, Dessau Co., Inc.
300 Fourth Ave.
New York City, N.Y., U.S.A.



New KEROTEST PURGE VALVE HAS GAUGE CONNECTION INDEPENDENT OF SERVICE CONNECTION

In the handling of high pressure refrigerants, common-sense and safety demands a valve especially built for the purpose—one that not only provides quick, positive transfer control but also one that is designed to give maximum protection to the service man.

For this purpose, the new Kerotest Purge and Charging Valves have a special gauge connection *independent* of the service connection. This Kerotest feature enables the service man to keep a constant check on the pressure inside the unit throughout the charging or purging operation, WITHOUT BREAKING ANY CONNECTIONS. It eliminates the inconvenience of removing the purge valve and attaching the gauge . . . greatly simplifies and speeds the operation yet provides an important safety factor.

For the sake of efficiency, safety and convenience, ask your local Kerotest Jobber about them.

KEROTEST
REGISTERED U.S. PAT. OFF.

KEROTEST MANUFACTURING CO.
PITTSBURGH, PA.

GUARANTEE PROFITS WITH GENUINE KELVINATOR PARTS

★ ★ ★ 1937 ★ ★ ★

Another Milestone in Your Business and in Ours

KELVINATOR THE PIONEER

PRESENTS

A New Partner in the Cause of Better Service

THE AUTHORIZED KELVINATOR PARTS JOBBER

Order Genuine Kelvinator Parts from Your Nearest Jobber

Atlanta, Georgia—M. D. Patterson Co.
Binghamton, New York—Service Supply Co.
Birmingham, Alabama—Auto Service Co.
Boston, Massachusetts—A. E. Borden Co.
Brooklyn, New York—Coleman Electrical Supply Co., Inc.
Buffalo, New York—Root, Neal & Company.
Charlotte, North Carolina—Henry V. Dick & Co.
Chicago, Illinois—Borg Warner Service Parts Co.
Chicago, Illinois—H. Channon Co.
Cincinnati, Ohio—Williams & Co., Inc.
Cleveland, Ohio—Williams & Co., Inc.
Dallas, Texas—The Electromotive Co.
Davenport, Iowa—The Republic Electric Co.
Detroit, Michigan—J. M. Oberc, Inc.
Fort Wayne, Indiana—H. J. Schroeder Co.
Greensboro, North Carolina—Hasco, Inc.
Houston, Texas—Walter Refrigeration Supply Co.
Indianapolis, Indiana—F. H. Langsenkamp Co.
Jacksonville, Florida—The Jamita Co.
Kansas City, Missouri—Forslund Pump & Machinery Co.
Los Angeles, California—Refrigerating & Power Specialties Co.
Memphis, Tennessee—United Refrigerator Supply Co.
Miami, Florida—Berner-Pease, Inc.
Milwaukee, Wisconsin—Thermal Company, Inc.
Newark, New Jersey—T. W. Binder Co.
New York, N. Y.—Paramount Electrical Supply Co., Inc.
Omaha, Nebraska—United Supply Co.
Paterson, New Jersey—White & Shauger, Inc.
Philadelphia, Pennsylvania—Victor Sales Corp.
Pittsburgh, Pennsylvania—Williams & Co., Inc.
Portland, Oregon—Refrigerating & Power Specialties Co.
Richmond, Virginia—Refrigeration Supply Co.
Sacramento, California—Hinshaw Supply Company.
St. Louis, Missouri—Brass & Copper Sales Co.
St. Paul, Minnesota—Thermal Company, Inc.
San Francisco, California—Refrigerating & Power Specialties Co.
Seattle, Washington—Refrigerating & Power Specialties Co.
Sioux City, Iowa—National Refrigeration Service.
South Bend, Indiana—F. H. Langsenkamp Co.
Springfield, Illinois—United States Electric Co.
Springfield, Massachusetts—C. P. Payson Co.
Syracuse, N. Y.—Syracuse Equipment Corp.
Tulsa, Oklahoma—Machine Tool & Supply Co.
Washington, D. C.—Refrigeration Supply Co.
Waterloo, Iowa—Winterbottom Supply Co.
Wichita Falls, Texas—United Electric Service Co.

Make the Parts You Use Help Sell Your Service!

KELVINATOR USERS DESERVE GENUINE KELVINATOR PARTS

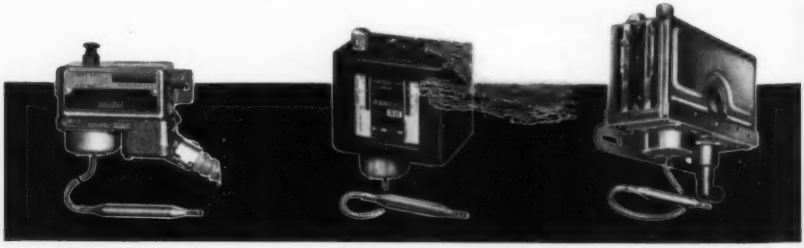
Ranco

COMMERCIAL CONTROLS

STRENGTH, simplicity and complete dependability—these are the qualities demanded of Temperature and Pressure Controls for commercial service. You'll find them all—in the steadily-growing line of Ranco Controls for Air Conditioning, Walk-in Boxes, Display Cabinets, Milk Coolers, Water Coolers, Ice Cream Hardening Cabinets, Steam Boilers and many other installations where *precision performance* and *heavy-duty service* call for real engineering and highest-quality construction.

Ranco Commercial Controls offer many important advantages obtainable in no other line. Tell us your needs and bulletins will be sent promptly.

RANCO, Inc. **Columbus, Ohio**



The Refrigeration Service Engineer

Vol. 5 No. 6

June, 1937

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

COVER

"A neat and attractive service truck is the best advertisement an independent service company can employ," say Wm. Drake and R. C. Robinson of the Refrigeration Service Co., Indianapolis, Ind., whose trucks are pictured on the cover of this issue.

Published by
Nickerson & Collins Co.
433-435 North Waller Ave.
Chicago
Telephones Austin 1303-1304-1305

EASTERN OFFICE
149 Broadway, New York City
Telephone Barclay 7-8275

Publishers of Technical Books and Trade Journals Serving the Refrigeration Industries for 46 years.

Subscription Rates United States $2.00 per year. Single copies 25c. All other countries $3.00 per year.

Copyright, 1937, by Nickerson & Collins Co., Chicago

TABLE OF CONTENTS

Rebuilding Hermetics, *by Geo. Edgar Wayne*.... 9

Electronics for Servicemen (Seventh Article) Field Motor Service Methods, *by Walter G. Christie* 20

Air Conditioning (Third Article) Self-Contained Units, *by W. C. Farmingdale*..... 24

Questions and Answers..... 26

- Tracer Chemicals 26
- Fishing Boat Installation..... 26
- Excessive Vibration 27
- Hold-Over Refrigeration 28
- Reboring Ammonia Compressor..... 28
- Head Pressures 29
- Moisture 29
- Converting Machine 29

New Mechanical Devices..... 30

Refrigerant and Oil Charge for Various Units, *by L. K. Wright*..... 33

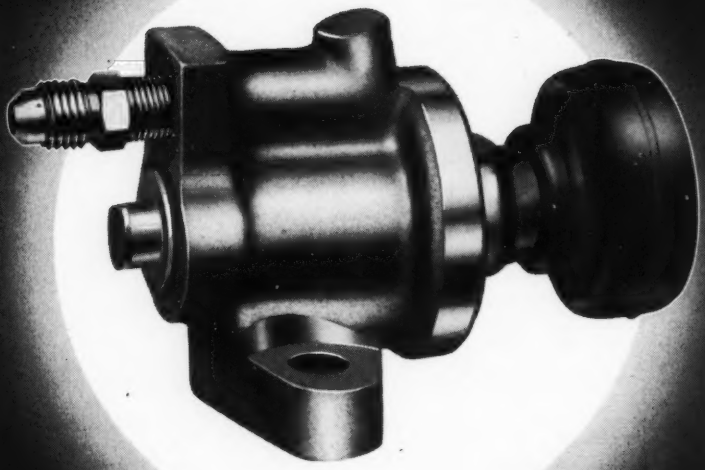
R.S.E.S. News 53

- Jobbers Are Hosts to Chicago Chapter..... 56
- Columbus Chapter Receives Charter..... 58
- Imperial Night at Twin Cities Chapter..... 59
- St. Louis Chapter..... 60
- Pittsburgh Chapter 61
- Mississippi Valley Chapter..... 61
- Central New York Chapter..... 63
- Chicago Chapter 63
- Long Beach, Calif., Applies for Charter..... 65
- Memphis Ladies' Auxiliary..... 66

Organization and Operation of a Cabinet Service Department, *by O. F. Boyer*..... 68

New Catalogs 77

Available now WITH A



FLANGED BODY

The Detroit Automatic Expansion Valve No. 676, heretofore designed only for ¼" female threaded outlet, is now available also with flanged outlet. Bolt holes are spaced on 1⅝" centers normally, but other spacing can be supplied when desired. Inlet, ¼" as illustrated—also available with the standard flare nut for ¼" tubing.

The No. 676 is sensitive, efficient, durable and compact. It is easily installed, it holds its adjustment and is quiet in operation—an ideal valve for domestic installations.

For full details ask for Bulletin 89

DETROIT LUBRICATOR COMPANY

DETROIT, MICHIGAN, U. S. A. • 5900 TRUMBULL AVE.

NEW YORK, N. Y.—40 WEST 40th ST. • CHICAGO, ILL.—816 S. Michigan Ave.

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

Canadian Representative—RAILWAY AND ENGINEERING SPECIALTIES LIMITED, Montreal, Toronto, Winnipeg

The Refrigeration Service Engineer

VOL. 5, NO. 6 CHICAGO, JUNE, 1937 $2.00 Per Annum

Rebuilding Hermetics

The Conversion of a Majestic Hermetic into a Standard Valved Unit

By GEORGE EDGAR WAYNE

THERE are a great number of sealed units in the field which now require or eventually will need servicing. Most of these sealed units have special charging valves whereby evacuation of refrigerant, or the addition of it, can be accomplished. Some merely have a pigtail of small diameter tubing, with the end pinched over and soldered. To get at the compressor or motor the unit must be opened up. If this is done as outlined in the following article the operator will be able to revamp the unit and produce a system capable of being serviced.

Most hermetically-sealed units are designed along the same lines and the worker can apply the data furnished herewith to almost any hermetic unit.

As a means of illustrating the conversion a Majestic hermetic unit was selected, for the manufacturer of this unit is now out of business. Fig. 1 shows a three-quarter view of the Majestic Model 100 unit, Fig. 2 presents a top view and Fig. 3 a three-quarter view from an angle opposite that shown in the first illustration.

The first step is that of removing the refrigerant from the system. All Majestic models with serial numbers from 1000 to 5000 were equipped with a charging tube which was pinched over. This may be located in the diagram given in Fig. 4, at the top of the check valve. By the use of a pinch-off tool this line can be opened up and the refrigerant removed from the system.

On models after serial number 5000 a special charging plug was used in place of the tube. Fig. 5 illustrates this latter type. The adapter threads on the Majestic hermetic were 7/8 inch x 14 threads while later Majestics were provided with 7/8 inch x 18 threads on the adapter. The screwdriver tang end of the special valve is slipped into the slot in the plug and this valve can then be opened. Evacuation is accomplished by either of the two methods which follow.

A special adapter is required to be fitted to the charging valve if so equipped and if one of these is available (purchasable at all large refrigeration supply houses) it should be attached to the port on the unit. An old compression or shop unit may then be connected to this valve and the entire charge pulled out of the system. In most instances this charge can be saved and used over again.

If desired (Method 2), the mechanic can make use of a screwdriver key to open the port. Place the unit out in the open, preferably an open lot or on a roof where the breeze will not blow the sulphur dioxide gas into any open windows, and crack the charging valve needle off its seat by means of this tool or screwdriver end. Allow the refrigerant to bleed out slowly. It is best to crack the valve and return every half hour or so and check up if gas is still escaping. It may be necessary to open up the valve a trifle each time. No refrigerant is saved by this latter method, but it eliminates the need for

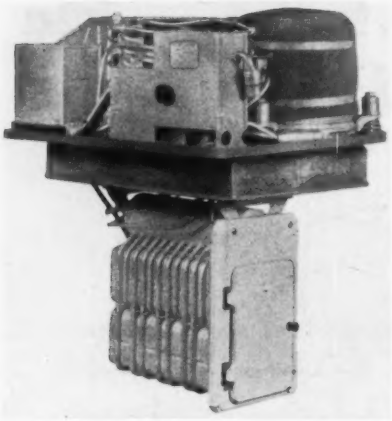


FIG. 1. THREE-QUARTER VIEW OF MAJESTIC 100 UNIT.

the special charging tool and the compression unit to evacuate the charge. All refrigerant must be removed before any work is performed. If there is a frosted or cold spot on the evaporator allow unit to bleed, or be evacuated, for some additional time.

Where the tube type is encountered, a pinch-off tool may be applied and the end of the tube flared or attached by a solder union to an evacuating compressor. If the charge is to be blown it is best to apply the pinch-off tool, cut off the end of the tube and then by using the pinch-off slightly open the pinched spot, allowing gas to bleed out. Keep opening the pinched off point until all gas has escaped.

With the unit relieved of refrigerant by either method and with the exit left wide open, unsolder all tubing from compressor dome and base, using a welding or gas torch for the purpose. Use the torch carefully as copper, which is the metal used for all tubing in the system, melts rather easily. Unsolder the three motor leads from the terminals at the base of the dome. Remove nuts and springs from the compressor section and place it on work bench.

The oil can be drained from the unit by turning it upside down and allowing the oil to run out of the discharge fitting on one side of the top of the dome. This is the opening to which the condenser was attached to the dome. See Figs. 4 and 7.

After preparing the machine in this way the job is ready to be cut open. First study Fig. 6, which gives a view of the interior arrangement found under the dome.

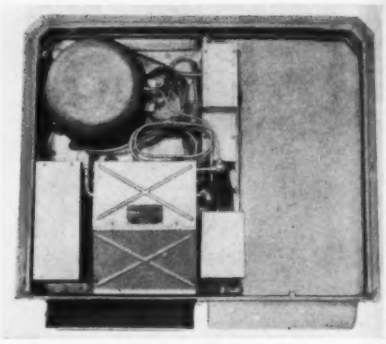


FIG. 2. TOP VIEW.

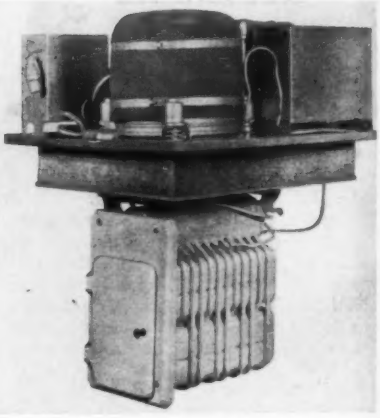


FIG. 3. VIEW OF ANGLE OPPOSITE THAT OF FIG. 1.

If the worker is a machinist and has a 16-18 inch lathe, the job can be done in his own shop. If no lathe is available take the unit to a reliable machine shop and have them chuck it true in the lathe by the base casting.

The pressed steel dome is to be cut 2 inches up from where the pressed steel dome is crimped and soldered to the base casting. (See Fig. 6.) A V-threading tool is the best to use in severing the dome, cutting the sides of the V wider than the tool itself so that when the tool cuts through it will not dig in and bend or distort the dome out of shape. All the burrs at both edges of the cut should be removed with a file. The compressor and motor are ready for disassembly.

Use a hot soldering copper to unsolder the splash cover from the four bolts that hold the stator in place. Do not use a torch for

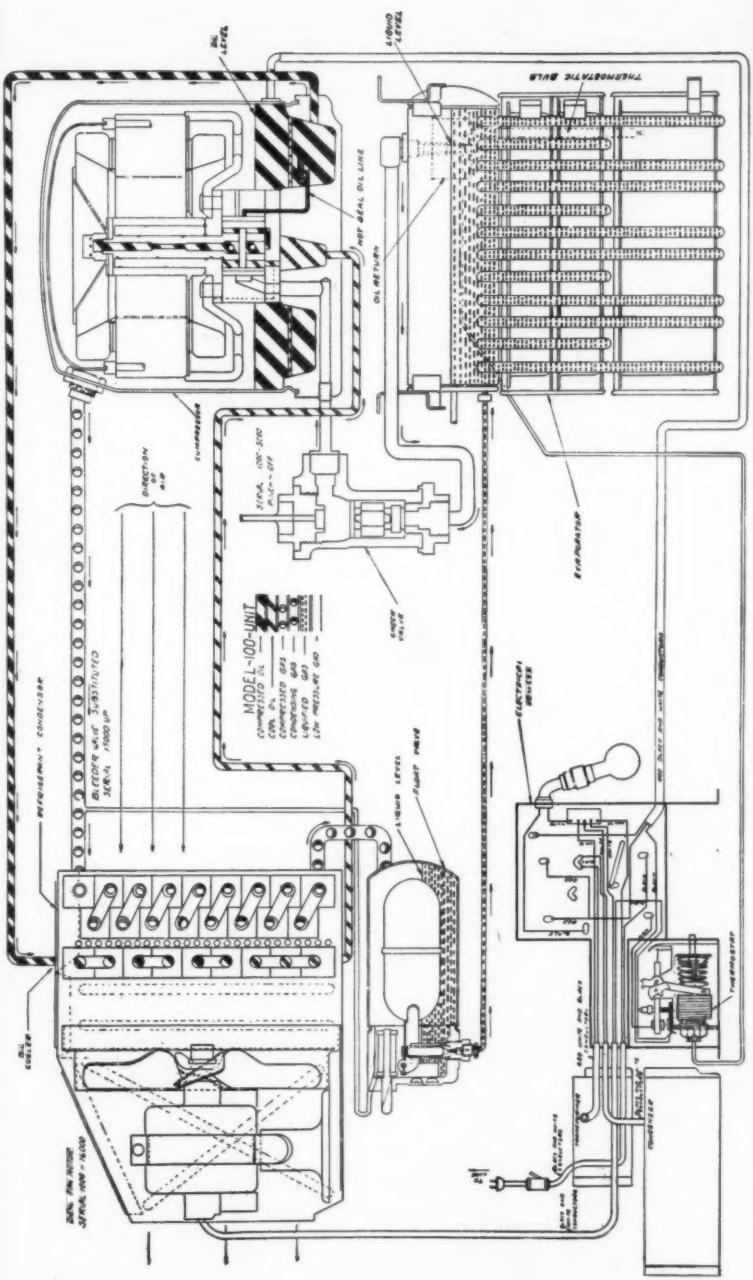


FIG. 4. CYCLE OF OPERATION OF MAJESTIC HERMETIC.

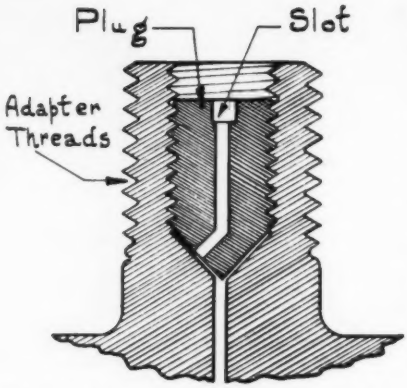


Fig. 5. Special Charging Plug Used on Models After Serial Number 5000.

this as the flame may wipe under the splash cover and burn the insulation on the stator windings. See Fig. 6.

With the splash cover unsoldered, remove the rotor nut and lift off the oil slinger and drive plate. The rotor can then be lifted out of the stator. With the rotor out, bend back the ends of the locking washers on the four 5/16 inch body bolts at the upper end of the stator, which will allow the stator and the upper part of the compressor to be lifted up, but not free, for there are three leads from the stator soldered to the inside end of the three ceramic terminals which project through the base casting.

Be very careful of the stator windings in taking the stator and compressor out of the base casting, as the insulation may be somewhat decomposed. Lay the base casting and stator on its side, with terminals down. Protect the ends of the stator windings with rags or waste. With the casting and stator separated as far apart as the stator leads will allow, pry out the base screen and unsolder the leads. Mark each lead upon removal, so they can be returned to proper terminal when assembly is made. Metal clip tags are best to use. Mark each terminal and each stator lead.

With leads unsoldered, stator and compressor moved from base, remove the four bolts which retain stator in the compressor bearing plate. Then remove stator from compressor bearing plate and place it where it will not be damaged. If accidentally struck with a tool or carelessly handled, the stator will have to be rewound. Therefore, wrap stator in waste or rags and place where it will not be injured, preferably in a dry, warm place so it will not absorb moisture.

Drive the rotor out of the compressor with a brass drift rod if it is stuck. If in good condition it will lift out easily. The rockers and vanes of the compressor are sometimes stuck very tight in the compressor where moisture has entered and formed sulphurous acid.

The rockers and vanes can be removed from the rotor, using care if force is required as the vanes are of hardened steel and liable to break if too much force is used. Take time in working the vanes out of the grooves. The cross pins can then be pushed out of the rotor, using care not to bend or break them. See Fig. 6.

It is best to wash all parts in strong aqua ammonia (28 per cent solution). Then polish all corrosion from the parts using very fine emery cloth (wet or dry). Assemble and ascertain if parts work freely. If parts are clean and not corroded they should be washed in aqua ammonia, dried one by one in a towel and then washed in carbon tetrachloride. Remove one by one from the carbon tetrachloride bath and, without drying, oil the parts with new, clean refrigeration oil. Lay parts away in oiled paper or cloth until ready to assemble.

Check the insulation on the stator windings, or send it to a good motor overhauling station for testing. If the windings have not been injured have it baked, then varnished and baked again. Where windings have been bruised it may be possible to pick out and repair the breaks or shorts, but if injuries to windings or wire itself are severe the only course left is a completely rewound stator.

Special Flanges

Special flanges must be made up to bolt the dome together. The main dimensions are given in Fig. 8. While iron castings can be used, bronze forms a superior material for the purpose. Bronze machines easier and tins much better than iron or steel.

The completed flanges must be tinned inside and out, it being preferable to heat the individual flange on a steel plate and to rub the surface with a stick of pure tin, using sandpaper and a cloth to wipe the tin on any spots which do not take readily. Use a good flux and wipe the flange so that it has an even coating of tin.

With the flanges thoroughly tinned, the ends of the dome at the point of severance must be tinned for a space just a little more

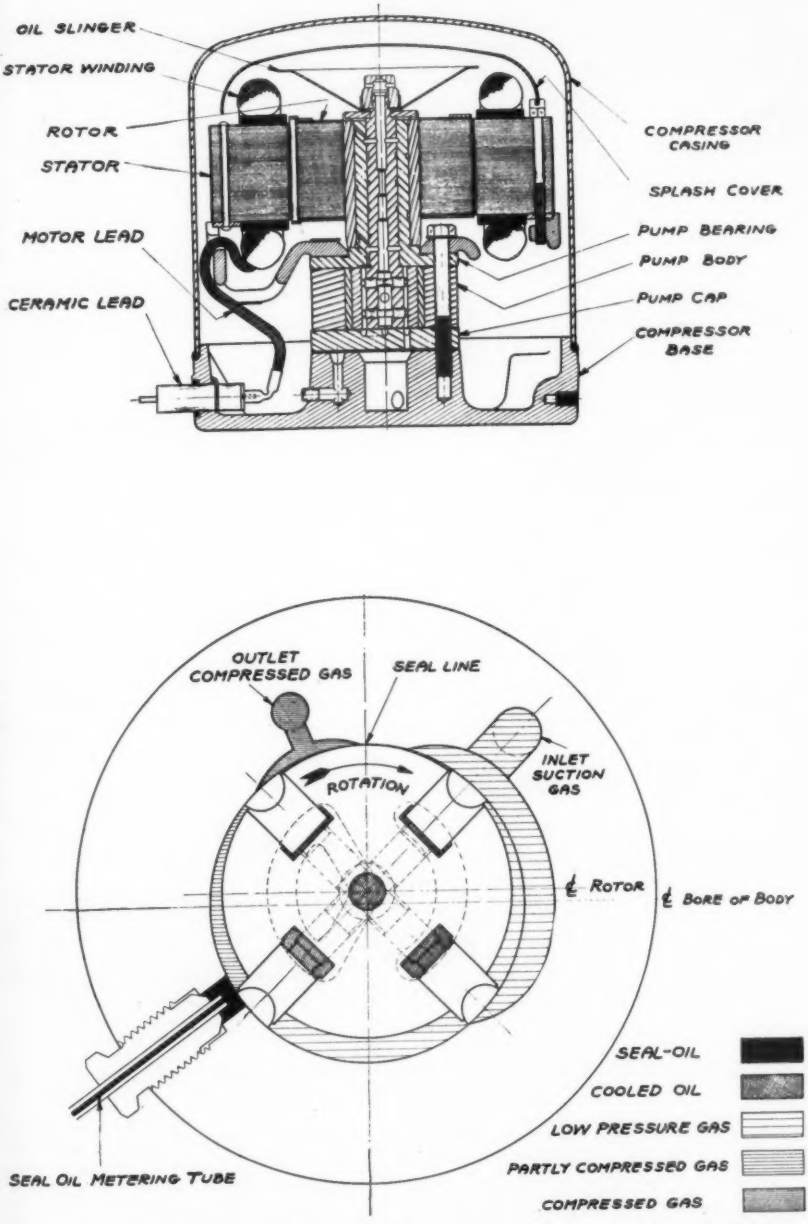


FIG. 6. ABOVE, VERTICAL SECTION OF MAJESTIC ROTARY TYPE COMPRESSOR. BELOW, HORIZONTAL SECTION THROUGH MAJESTIC PUMP.

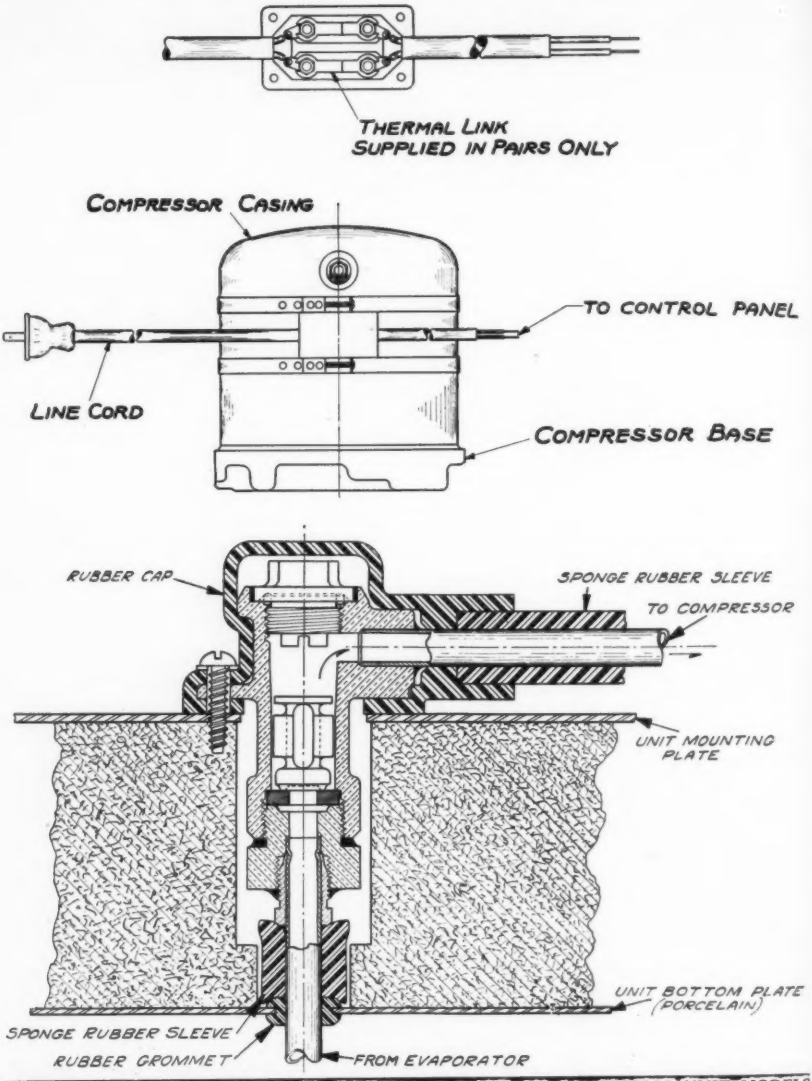


FIG. 7. ABOVE, ARRANGEMENT OF THERMAL CUT-OUT ON COMPRESSOR UNIT MODELS 100—101—102—103. BELOW, CHECK VALVE.

than the thickness of the flanges. Use a good flux and take time to tin the entire area thoroughly.

Setting Flanges

Slip a flange on one part of the dome and sweat or spot together enough to hold them in position so that the dome can be flanged out against the lower edge of the casting with a ball peen hammer. Do this flanging carefully and evenly, for when the machine is charged and in operation the total force is about 2,000 lbs. pressure.

When the dome is peened over firmly and

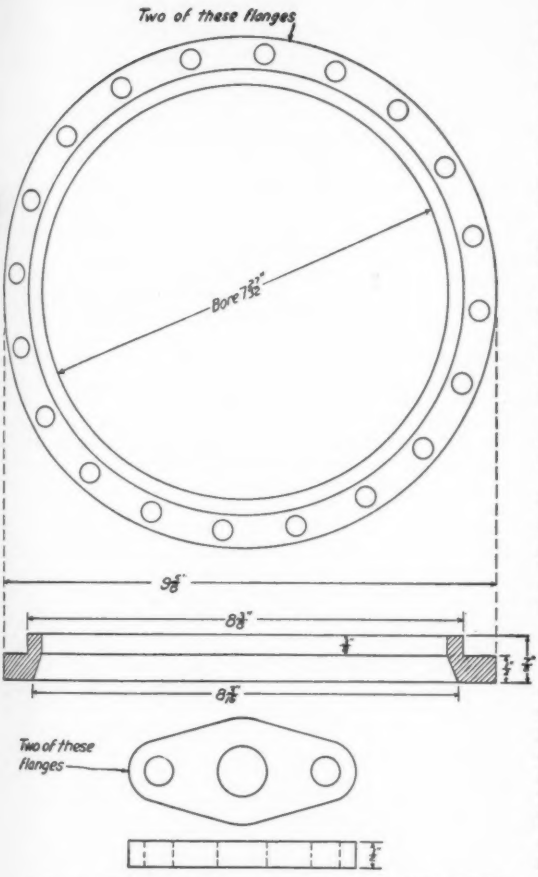


FIG. 8. SHOWING SPECIAL TYPE OF FLANGES USED.

seats evenly, sweat the two (dome and flange) together, making sure solder flows evenly and goes all the way through.

Next line up the flange on lower section so the bolt holes match with the flange on the dome. Peen over the edge and sweat in place, as in previous case.

Service Valve Flanges

Two flanges are required for the service valves. These flanges can be made or can be purchased from the valve manufacturer, already drilled and tapped. It is best to purchase these valve pads and the valves from the same manufacturer. Modern refrigeration fittings are of forged brass and pads of this material will give no trouble through porosity. The pads need not be of the same size, as it is essential they fit the valve intended to be attached to each. The service valve for the discharge line should be of ¼ inch size; the suction valve, and outlet of 5/16 inch.

The suction line fitting in the base casting is ½ inch x 20 thread. Make a stud of steel, 1¾ inch long with a ½ inch of thread on each end. Drill a ¼ inch hole through center of stud. The flange pad must be drilled and tapped to receive this stud.

Tin threads of valve pad and stud and screw together while solder is molten.

Next heat the fitting in the base of the casting, insert screw stud and sweat together. This provides the pad for the service valve. Set this pad in place so valve will look in proper direction when attached to the pad.

Discharge Pad

A pad must be adapted to the discharge fitting in the top of the dome. The thread is 7/16 inch x 20 threads. Make a stud of steel 1¼ inch long, with ½ inch of thread at each end. Drill a 7/32 inch hole through the center of this stud. Drill and tap flange to take this stud and sweat flange and stud together. Insert assembly and sweat in place.

Have both flanges or pads turned the way the service valves are desired. Check this before the final sweating in place.

Oil Cooler

By referring to the diagram shown in Fig. 4, it will be observed that a separate oil cooler is provided, the oil circulating through this cooler and re-entering the compressor base. It has been found that this may be eliminated. Where the oil cooler was eliminated the unit ran just as well and remained cool. Therefore, the operator can eliminate the cooler if he so desires. If the cooler is to be eliminated the oil lines can be removed.

Plugs must be made to seal the oil holes in the base casting, where the oil pipes originally came out. Remove the fittings from oil pipes and sweat in nipples of copper tubing about two inches long. These tubes and fittings must be sweated into base casting. Before sweating in place flatten the open ends of the nipples and fold them over to seal the ends. Sweat the ends with solder. If desired, use a regular solder fitting of the cap type to close the end of the tube.

Remove the charging tube from base casting if the unit is so equipped. Plug and solder the hole up permanently as it will not be used again.

Gasket

Make up a gasket of 1/16 inch sheet asbestos stock. Use a large caliper to scribe out the circles. Cut the bolt holes out with a punch. Make a perfect gasket. One that is poorly made, torn or cracked will give trouble later.

Apply gasket, wiping it with refrigeration oil and bolt dome together. Put service valves in place, using asbestos gaskets. In pulling up on bolts, whether on valves or large flanges, bring faces together evenly. Close discharge valve and bonnet or cap main opening. Have pipe plug in service port. Close (screw stem in all the way) the suction service valve. Insert a half union (1/4 inch S.A.E. flare x 1/8 inch pipe) into service port of the suction valve and attach 1/4 inch O.D. copper tube to it by means of a flare nut. Submerge the assembly in a tub of water, completely submerging dome and apply an air pressure of 150 pounds. Look for bubbles. Check carefully. Remove from water bath if tight and dry carefully. If bubbles indicate leaks mark point of leakage and repair. Do not get any moisture in dome.

The condenser line should be unsoldered from the float tank and the capillary tube leading from it removed from the evaporator or cooling unit. Remove capillary tube from float tank, as this may be plugged up. If this is the case try blowing carbon tetrachloride through it, using a cylinder of carbon dioxide to furnish the pressure. Another way of cleaning the capillary is to straighten it out. A fine piano wire can then be forced through it to clean it.

If these methods are of no avail, measure the length of the tube carefully and cut into it in several places to get the inside diameter so a similar tube can be secured.

Testing Float Valve

Test the float valve by using an electromagnet. The float ball is of steel and the magnet will lift it if it is free. Snap current off and on and listen carefully to determine if float is free. Carbon tetrachloride or xylene will free it and remove any sticky or gummy oils.

Where the float is stuck the old one will have to be cut in half, or a new one installed. Where the float is to be repaired cut the tank about 1/4 inch from where it is crimped in the casting. When dome section is free squirt xylene on the needle socket and allow to soak. When it is free move needle up and down with the float and work more fluid into and around the needle until perfectly free. Clean out with carbon tetrachloride and set in a warm place to dry out. Xylene is highly inflammable and care must be exercised in its use to avoid open flames in the vicinity. By washing with carbon tetrachloride and letting dry all danger is eliminated.

To put the tank together, fit a brass sleeve made out of a piece of tube which will slip over the tank and sweat this in place. A band about one inch is sufficient. Solder in the capillary and test for leaks with 150 lbs. of air pressure.

With this assembly tight, test float valve for tightness. To do so submerge the end of capillary in refrigeration oil and apply 100 lbs. air pressure. If the valve is tight, there will be no bubbles from the end of the capillary tube under oil. Raise float with magnet and see that air bubbles out of tube, indicating tube is open and not plugged. Put the tested float valve chamber back in place and solder in all connections.

Cleaning Condenser

The condenser and evaporator should be washed out with xylene, followed by a carbon tetrachloride cleaning. Then test for leaks. Put a 1/4 inch flare nut on the outlet line, plug the inlet line, attach a cylinder of sulphur dioxide and test with 28 per cent ammonia for leaks. Use a pipe cleaner as a test stick, passing it close to any part suspected of leakage. Presence of "smoke" indicates leak—the "smoke" being densest at the leak. Do not touch any copper or brass with the ammonia swab as it will turn the parts green.

Assembly

After all parts have been tested and

proven gas tight and lines proven clear, assembly work can be started.

Assemble motor and compressor, oiling all parts with 75-degree viscosity sulphur dioxide oil. Purchase this oil in a sealed can from a reputable refrigeration supply house. Keep can sealed to prevent entrance of moisture. Oils will take up moisture from the atmosphere, even on short exposure; the old theory that oils repel water being to the contrary. Therefore, fill a new oil can, or one first cleaned out thoroughly with carbon tetrachloride and then fill with the oil specified above. The finest automotive oil obtainable will not do as a substitute. Its use may result in ruining the job. Use the proper oil.

Motor Leads

The red wire of the motor leads on the control panel is the wire for the starting coils. Neutral or common wire is black. The white wire leads to the running coils. See Fig. 4 for complete wiring data.

With wires hooked up correctly test motor and see if it has plenty of starting torque. If slow in picking up speed, motor may not be properly wired, or one of the windings may be shorted. *Caution:* Do not run motor for any period longer than a half minute, as it is working with the oil film supplied in assembly and has no oil circulating through bearings as in normal operation. Longer running may throw off the oil and result in bearing seizure.

Testing for Leakage

If the assembly appears free and in proper operating condition, bolt dome section on and test for leaks, after properly plugging or sealing over openings, by submerging in a tub of water and applying 150 lbs. air pressure. Inspect gasket carefully before setting in place and coat it with refrigeration oil. Make up bolts slowly and evenly, working across the head each time on opposite bolts.

Lines and Valves

The suction line must be flared and a 5/10 inch flare nut applied to connect this line to the new suction service shut-off valve. Make up the discharge line, flaring and using a flare nut to connect it to the new discharge service shut-off valve.

Charging with Oil

After completing the tube connections machine is ready for oil charge. To get the oil into the compressor chamber, close the suction valve, so as to prevent any air from being pulled from the suction line itself. Take the service plug out of the port on the suction service valve and in its place insert a half union (¼ inch S.A.E. flare x ⅛ inch P. thr.). Attach a piece of ¼ inch copper tubing to the union and have the open end dip down to very bottom of a clean, dry glass vessel. As air must not be sucked into the unit it is necessary to have a little extra oil in the bottom of this glass vessel. Therefore, pour in oil to a height of about an inch. Mark this with a piece of chalk or use a rubber band about the vessel to indicate it. Measure out three pints of oil and pour into the vessel. This is the correct oil charge to be gotten into the machine.

Close the discharge service valve, so air will not be pumped to discharge line and condenser. Remove pipe plug from service port of the discharge service valve so that compressor will exhaust to the open.

Start motor and have compressor draw in the correct oil charge. When the oil has dropped to desired level pull electric plug. Remove half union from service port of suction service valve and either screw in compound gauge or a line can be attached for connection to a gauge test set.

Evacuating System

Open suction service valve wide and then lift slightly off its back seat, so as to get a reading of conditions when machine is operated.

Operate motor and while operating use an electro-magnet to lift the float. This permits air to be pulled out of the float chamber and condenser. Keep in operation until a vacuum of 20 or more inches of vacuum is secured. The more inches, the better, so operate until lowest pressure is secured. If air continues to be evacuated from the service port there is a leak, probably due to a bad flare or one that has split due to excessive pressure being exerted on the nut.

Assuming 20 inches or more of vacuum is secured, keep machine running and close suction service valve so as to cut off communication with suction line. Then stop motor. Connect a cylinder of sulphur dioxide to the service port of the suction service valve by means of a half union (¼ inch S.A.E. flare x ⅛ inch P. thr.) and ¼ inch copper tube. Have cylinder stand upright. Crack cylinder valve so as to admit gas to the dome. Sulphur dioxide is a heavy gas and as it fills up the dome it will lift the air and push it out of the open service port on the discharge service valve. When gas odor becomes strong, close cylinder valve. Screw pipe plug

in discharge valve port. Then open the discharge valve wide to the discharge line and condenser.

Charging System

The charging line, or copper tube leading to the cylinder, should have a loop or two in it. Stand cylinder on a sensitive scale and adjust loop so it has a negative effect. Read scale carefully.

Open cylinder valve and then start machine. Keep running until 3 lbs. 12 ozs. of sulphur dioxide is in the system. This is the correct charge for this machine.

Stop machine when correct weight of refrigerant is in the system. Close cylinder valve. Then screw stem of suction service valve so that the charging line is cut off from system. This is done by unscrewing all the way or backseating, as it is termed. Take off charging line and then remove half union. Insert compound gauge in port (30 inch vac. to 60 lbs. pressure is a good gauge to use, if it be graduated in increments of one inch and one lb.). Crack suction service valve off its back seat so gauge registers. Operate machine for at least a half-hour. Then let stand for fifteen minutes, inoperative.

Carefully crack discharge service valve off its back seat so a tiny trace of gas comes out of the service port. Let it bleed this way for ten minutes. Then screw a pressure gauge into this port. It may be necessary to crack the discharge service valve somewhat further off the back seat to get the gauge to register properly.

Giving Test Run

Place machine unit in refrigerator and let run all night. See that gauges register; hands should move slightly, not violently, nor should they be dead or motionless.

Hang a thermometer in the room in which the refrigerator is located and place a thermometer in the center of the refrigerator.

Next day take thermometer reading of room temperature. Note back (low) pressure and head (high) pressure and mark them down. If the pressures given below correspond, unit is correctly charged. If higher head pressures are encountered there is air in the system or a slight overcharge. Bleed out as given previously if air or overcharge. If under given head pressure, add refrigerant, in the manner previously outlined. When adding charge, leave flare nut slightly loose and blow the air out of the charging line. Then tighten flare nut and proceed with charging operations.

Make sure machine has been running for at least five minutes before taking readings. Check condition by waiting a few minutes, when back pressure will be found to have fallen, so a new head reading will result.

Revamping Unit Without Flanges

By examining Fig. 6, the sectional view of the dome section, it will be observed that the dome does not come down close to the splash cover. It is possible to grip the dome section in a lathe by means of the base casting and to cut away the crimped seal. By cutting as little metal as possible, the dome can be returned to place after the interior sections have been overhauled and crimped and sweated back into place.

This is the procedure where the customer wants a less expensive overhauling job and is not interested in having the system converted to a serviceable or valved type.

Some smaller shops, not equipped with a large lathe nor desirous of sending out work, rig up a grinder with a narrow wheel and grind away the old seal and crimp. Carefully done, this is just as good as a lathe job.

When replacing the dome the peening work should be carefully done, working slowly around and around the dome until it fits snugly and evenly in place. Solder in place by use of a torch and do this work quickly. Cool assembly as soon as through

OPERATING CHART

Low (Back) Pressure Reading	Temperature of Room Air, °F.							
	60°	65°	70°	75°	80°	85°	90°	95°
	Pressures given below are pounds per sq. in.							
14 inch	48 lbs.	54 lbs.	60 lbs.	66 lbs.	70 lbs.	77 lbs.	82 lbs.	85 lbs.
11 inch	52 lbs.	57 lbs.	63 lbs.	68 lbs.	75 lbs.	83 lbs.	84 lbs.	88 lbs.
9 inch	54 lbs.	58 lbs.	64 lbs.	70 lbs.	76 lbs.	84 lbs.	87 lbs.	94 lbs.
6 inch	57 lbs.	61 lbs.	67 lbs.	75 lbs.	80 lbs.	86 lbs.	94 lbs.	105 lbs.
3 inch	63 lbs.	68 lbs.	74 lbs.	79 lbs.	85 lbs.	91 lbs.	95 lbs.	107 lbs.
0.5 lb.	67 lbs.	71 lbs.	76 lbs.	81 lbs.	87 lbs.	93 lbs.	97 lbs.	109 lbs.
2.5 lbs.	70 lbs.	74 lbs.	78 lbs.	83 lbs.	90 lbs.	95 lbs.	105 lbs.	111 lbs.
4.5 lbs.	77 lbs.	80 lbs.	84 lbs.	87 lbs.	94 lbs.	102 lbs.	108 lbs.	113 lbs.
7.0 lbs.	82 lbs.	87 lbs.	93 lbs.	102 lbs.	106 lbs.	108 lbs.	112 lbs.	121 lbs.

soldering so that motor section will not be injured or any oil burned on the bearing surface.

Hermetics in General

Most hermetic apparatus employs the high side float valve as a throttle device, just as

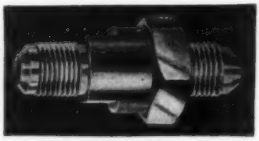


FIG. 9. FEDDERS CV-36 CHECK VALVE.

the Majestic models do. Basically, therefore, all units will be found to be similar to the machine we have just discussed, so that by intelligent analysis, any hermetic can be pulled apart and either reassembled or revamped into a serviceable type of unit.

These hermetic types offer an excellent return for the service station, especially during the winter months when plenty of shop or inside work is desirable.

Where copper lines are found to be battered or corroded, remove and replace with new material.

Machines which operate, but give trouble due to float sticking, etc., will not require much in the way of overhauling, as the sections will come apart easily and the unit can be reassembled in short order. Clean all parts with xylene and wash with carbon tetrachloride, then immediately coat with refrigeration oil to prevent rusting of the chemically clean steel surfaces.

The check valve shown in the lower part of Fig. 7 is used to prevent high pressure gas from blowing back to the low side when the unit stops operating. The seat should be polished and valve made to close properly before reinstalling. If desired, or where the valve is damaged, a new check valve can be installed. For this purpose a Fedders Model CV-36 Check Valve can be used. Fig. 9 shows one of these valves, and Fig. 10 gives the structural details as well as dimensions.

Tube ends can be brazed or sweated into this valve very easily, disassembling it for the sweating operation so as not to injure the spring or warp the seat.

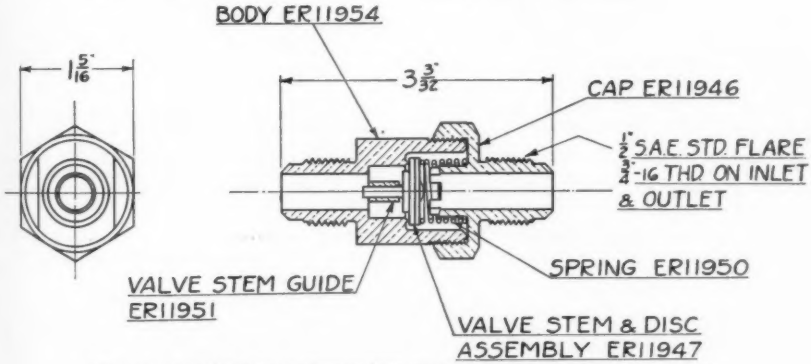


FIG. 10. DETAILS OF DIMENSIONS OF FEDDERS CV-36 CHECK VALVE.

COMFORT COMES IN PACKAGES

AMERICA will be buying thirty per cent of its air conditioning comfort in packages this summer, packages resembling radio consoles or enclosed radiators. This is the prediction of J. K. Knighton, Commercial Air Conditioning Sales Manager of the Nash-Kelvinator Corporation, who estimates that many millions of dollars of the nation's air conditioning purchases this year will go for this kind of equipment.

The unit room cooler, Mr. Knighton has explained, is a "mobile" air conditioner which does not depend upon duct work and remote control. It is a cabinet that may be installed anywhere there is electricity and water, or windows, and for this reason is the most easily installed and the least expensive of reputable air conditioning equipment.

An outstanding advantage of the room cooler, according to Mr. Knighton, is its simplicity of operation. The business man, salesman, or housewife can "turn on the cold" as easily as electric lights. The room cooler will then function on a complete air conditioning basis, washing, dehumidifying, circulating and cleaning the air.

Seventh Article *Field Motor Service Methods*

Electronics for Servicemen

How to Determine if Repairs Can Be Made in the Field

By WALTER G. CHRISTIE, B.S.E.E.

WHEN a serviceman is called in to service a refrigerator with motor trouble, he should be able to quickly diagnose the trouble and decide whether or not the motor can be repaired in the customer's home or whether it must be returned to the shop. The purpose of this article is to give a practical field test procedure to tie-in with the theoretical discussion on motors which preceded this article.

To start off, let's first consider the d.c. motor. As we learned previously, both the field and the armature of a d.c. motor are connected to the supply line all the time that the motor is operating. The two motor leads are connected directly to the field winding. Then two pig-tail leads are taken off the motor leads and are attached to the brushes. Thus current flows from the line into the field through the motor leads and into the armature through the pig-tail connections and the brushes as shown in Fig. 1.

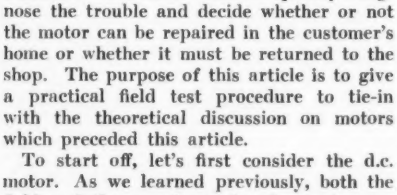


Fig. 1. Brushes on d.c. motors are connected directly across the supply line so that if the serviceman should touch both brushes at once, he will get a shock.

Note that 115 volts are applied to the field and also to the armature so that if you should accidentally touch both brushes at once, you'll get a shock. As you'll recall from the May issue, the d.c. motor is different from the repulsion-induction motor in that you can touch the brushes on an r.i. motor at any time without the danger of getting a shock.

Unlike the r.i. motor, the brushes on a d.c. motor ride on the commutator all the time the motor is operating. Hence the brushes are continuously wearing and as a result they must be replaced regularly. (This is the major reason why hermetically sealed units cannot be designed to operate directly from d.c. supply lines. Up until the present time, a d.c. motor has not been designed to operate without some sort of sliding contact between the armature and field. And since an hermetically-sealed job cannot be opened up easily in order to change this sliding contact, hermetically sealed jobs cannot be operated on d.c. circuits unless they are equipped with some intermediate device which changes the d.c. to a.c. before it is applied to the motor leads.)

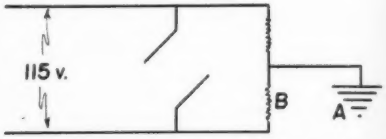


Fig. 2. Schematic diagram showing how brush dust between each brush and ground effectively creates a short circuit between brushes. (a) Effective resistance set up between brush guide and ground, which causes Bakelite brush holder to burn out. (b) Brush resistance between one brush and ground.

When a complaint is received that the motor is stopped, check to see that the switch is turned on and that the wall receptacle is alive. Then gingerly give the fan a push with your hand. If the motor attempts to start, no doubt the brushes are too short to make good contact with the commutator. Then pull the plug out of the wall and on those jobs where it is possible, examine the brushes. On early model Frigidaire and Kelvinator jobs which are equipped with Delco models 3116, 3513, etc., motors, it will be necessary to remove the motor from the cabinet to examine the brushes. On other models and other makes which are equipped with Delco models 4367, etc., or with Emerson motors, the brushes may be examined by merely removing the brush covers on the end plate of the motors. Brushes on Dayfan motors may be examined by unscrewing the brush holder cap on the sides of the motor and pulling out the brushes.

Before replacing short brushes, examine the commutator of the motor. This is invariably made of copper bars separated by mica strips. Oftentimes the copper wears down and leaves the hard mica strips standing higher than the copper. Then as the motor revolves, the mica acts like an emery wheel and quickly grinds down the carbon brushes. If this condition is found, it is often best to return the motor to the shop and turn down the commutator in a lathe. However, when the mica condition is not so bad, the commutator can be dressed down with a commutator stone after the new brushes are installed. To dress down a commutator, install a new set of brushes and then turn on the motor. Hold the commutator stone firmly against the commutator and continuously move it across the whole face of the commutator so that ridges are not cut in the commutator by holding the stone in one position too long.

Commutator Badly Channeled

Sometimes it will be found that the commutator is badly channeled out or that hard spots on the brushes have worn the commutator into an irregular shape. Experience has proven that it is a poor policy to just install new brushes on jobs in this condition. At best the repair is only temporary and the uneven commutator is bound to spark and cause radio interference. Oftentimes, enough heat is generated by sparking to cause the armature to throw its solder and loosen up the wires which are attached to it. When this happens, the armature often burns out.

Before giving the customer a price for repairing this type of motor trouble, *the serviceman should carefully examine the commutator to see that it is not so badly scored that the entire commutator will be cut away in the lathe before the commutator can be trued up.* If the commutator is badly scored, a new commutator will have to be installed and the price of the motor repair will be much higher than if the commutator only had to be trued up.

Care must be taken in replacing brushes in a d.c. motor. Since the motors are wholly enclosed, the carbon dust formed by the wearing away of the brushes must be trapped inside the motor. Now carbon is a conductor of electricity and if the carbon dust is distributed inside the motor, trouble is bound to occur. For instance, a common complaint with d.c. motors is "blown fuses" or even "motor is burning." In 90 per cent of these cases carbon dust is causing the trouble and nothing is seriously wrong with the motor. The carbon dust forms a coating between each brush holder and ground and what is the result? A short-circuit is then formed. Oftentimes brush dust won't show up as a short-circuit for a long period of time. However, the dust forms a resistance on the brush holder and since there are 115 volts across this resistance, the resistance gets hot. Oftentimes sufficient heat is generated to actually burn away the brush holder. Of course when a condition like this is found, the serviceman must include the cost of a new brush holder in the price of the motor repair.

From the above discussion on brush dust, the serviceman should realize that in order to prevent a future call back, it is best to carefully wipe off all parts of the motor before installing new brushes.

Experience has shown that it is quicker and easier to disassemble Delco 31 series motors when installing brushes rather than to fish for the brushes in the small space provided. Also when the motor is disassembled, the brush holder can be thoroughly cleaned before the brushes are installed. When reassembling the motor, take care not to pinch any of the wires between the end cover and the motor frame. If the motor end covers don't seem to go together properly, check to see that some stray wire isn't caught between the end cover and the motor frame. Also check to see that the slot in the oil throwers are over the pins in the motor shaft. See Fig. 3.

Oftentimes after installing new brushes, the motor will "sing" noisily because the

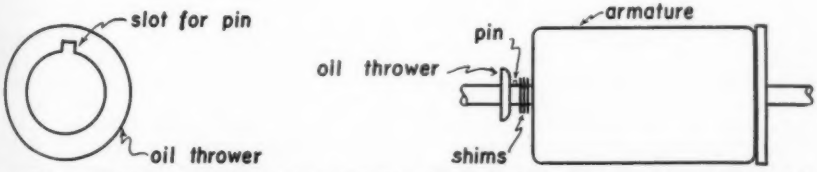


Fig. 3. When reassembling the motor, be sure the slot in the oil thrower is over the pin in the shaft, or else the shaft will bind in the motor end bell.

new brushes are not properly shaped to fit the commutator. To eliminate the sing, first try stoning the commutator. This will cut down any rough spots that may be causing the noise. If this doesn't do the trick, stop the motor and make a light scratch diagonally across the face of the commutator with a screw driver. Then start the motor. The sing should now be replaced by a loud clackety-clack as the scratch passes under the brushes. This scratch will cut the brushes

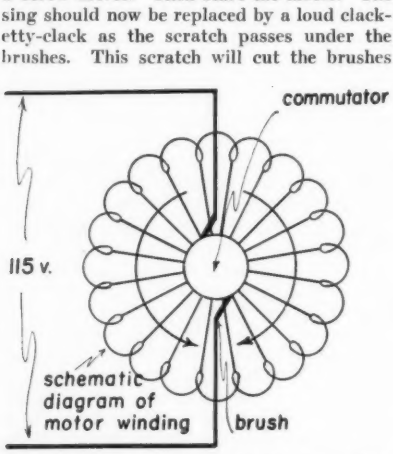


Fig. 4. Equivalent circuit of a d.c. motor which has twenty taps and twenty armature bars. Two current paths are formed as shown by the two arrows. Since there are twenty taps, the 115 volts will be applied between ten armature turns so that there will be $\frac{115}{10} = 11.5$ volts between each commutator bar.

so that the brush face conforms to the contour of the commutator. Allow the motor to operate several minutes and then lightly stone the commutator to remove the scratch. In most cases this will stop the brush sing. If the sing persists, see that the new brushes are of the same composition as the old ones.

Sometimes the serviceman will be called upon to service a motor which is sparking badly. This may be caused by one of a number of things. If a fat, vicious spark occurs under *one brush,* the armature generally has an open winding. In order to determine whether or not this is the trouble, stop the motor and with the aid of a flashlight carefully examine the surface of the commutator. If a section of the commutator is found to be badly burned between two commutator bars, the armature is open at that place. It may be well to tie-in our theoretical knowledge at this point to show why these two bars are badly burned. Consider Fig. 4 which shows an equivalent circuit of a d.c. armature hooked up to a 115 volt supply. Note that the armature is tapped in 20 places so that the commutator must have 20 individual bars. Notice that when the brushes are in position, two paths are formed by which the current flows through the armature. Hence the 115 volts are divided between ten sections of each path of the armature. This means that the voltage between any two commutator bars is $\frac{115}{10} = 11.5$ volts so that as either brush passes over the dividing line between two commutator bars, the brush short-circuits 11.5 volts. But what happens when one winding is open? Consider Fig. 4A. Here it is seen that when one winding is open the whole 115 volts are applied between the two bars of the open winding. As a result each time the open segment passes under a brush the full 115 volts are applied across the face of the brush. This is practically the same as opening and closing a switch

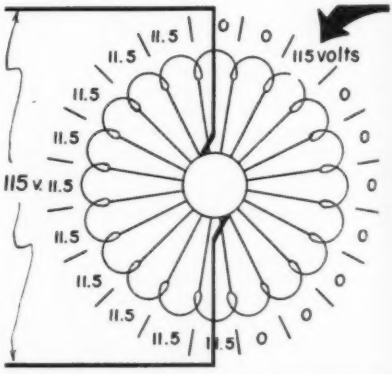


Fig. 4a. When the armature is open-circuited, the whole 115 volts exist between two commutator bars instead of the normal 11.5 volts. As a result, the brush sparks badly when it passes over the insulating strip between the two bars which are connected to the open winding. This causes the two commutator bars to burn badly.

across the open post of the winding as shown in Fig. 4A, and since the armature is revolving at 1800 r.p.m., the sparking at the brush appears to be continuous.

When a motor is found with an open winding, carefully examine the wires at each of the burned commutator bars. Generally it will be found that one of these is broken or is poorly soldered to the commutator. When the break is found it can generally

be repaired on the job without much trouble. However, sometimes the break is inside the armature itself. When this happens it is best to replace the motor. However, when a replacement motor is not available, a repair can be effected by short-circuiting the open commutator bars with a drop of solder or by swedging the bars together with a screwdriver and hammer. Of course the soldering or swedging should be done at such a place on the commutator that the solder or swedge will not interfere with the brushes.

Another type of sparking sometimes encountered with d.c. motors is called ring fire. When the armature is revolving, the entire commutator is surrounded by a ring of yellow flame; hence the name ring fire.

This is generally found only on those motors whose commutators are undercut. (Some manufacturers cut the mica strip on the commutator to a depth of about one-eighth inch to be sure that the copper won't wear down and leave high mica. This process of cutting the mica is called undercutting.) When the commutator has been undercut, any oil that chances to land on the commutator absorbs brush dust and gets lodged inbetween the commutator segments. Then the brush dust sets up a resistance between commutator segments which carries current, gets hot and glows. Because the armature is revolving at 1800 r.p.m., this glowing appears as a continuous ring around the commutator.

Fig. 5. Hack saw blade ground to form a commutator cleaning hook.

To eliminate ring fire, the motor should be completely disassembled and all parts thoroughly washed in kerosene to eliminate all carbon dust and oil. Then the commutator slots should be cleaned with a cleaning hook made by grinding down the end of a hacksaw blade as shown in Fig. 5. After the slots are cleaned the commutator should be washed with carbon tetrachloride to remove all traces of oil and carbon dust. In reassembling the motor, take care not to get oil on the commutator.

A common service complaint on d.c. motors is radio interference. Because the brushes on a d.c. motor are carrying current all the time that the motor is operating, the slightest irregularity in the commutator

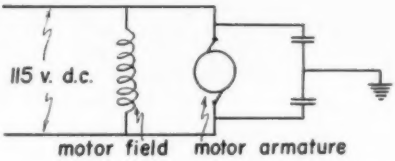


Fig. 6. Schematic diagram showing how to connect a pair of condensers across the brushes of a d.c. motor to stop radio interference.

will cause a slight spark to occur on the commutator. This spark will cause a crackling noise in a nearby radio.

Up until several years ago, most d.c. refrigerator motors caused radio interference. However, recent motors have a built-in noise trap which effectively silences radio interference in these motors. This trap consists of two 500 volt ½ microfarad capacitors connected between the brush holders and ground as shown in Fig. 6. If radio interference is generated by a new style motor, one of these capacitors may be defective. To check this, turn the radio on and bolt the frame of a ½ mfd. (microfarad) capacitor to the frame of the motor and touch the wire of the capacitor to first one of the brush holders and then to the other. When the noise stops, change the capacitor connected to the noisy brush.

A pair of capacitors may be installed on old style d.c. motors to eliminate radio interference by fastening the frames of the capacitors to the frames of the motor and then connecting the wire of each capacitor to one brush holder.

S S S

G. H. Bridson
New Zealand

I would like to say that I derive much knowledge and pleasure from the perusal of your admirable publication, both on the service and estimating sides of the business.

Your correspondence from this far away corner of the globe will not be as extensive as from your own States I suppose, but I must add my small voice to the hordes of servicemen and their administrative heads whose letters of appreciation I find published on your pages.

Thank you for an endless source of interest, THE REFRIGERATION SERVICE ENGINEER.

S S S

Otis Wolf
Illinois

I like the R. S. E. book fine and you can count on me being a subscriber for a long time.

Third Article

Air Conditioning

Operating Principles of Portable Coolers

By W. C. FARMINGDALE

DURING the past three or four years, air conditioning apparatus for use in the home and office has developed rapidly. Most manufacturers have developed a machine that can be installed readily without breaking through walls and spoiling room decorations in the installation procedure.

Up until recently, practically all room air conditioning equipment used water-cooled compressors. This meant that if a room cooler was to be installed in a living room or in a bedroom, water lines would have to be run from a drain and water supply pipes in the bathroom or kitchen to the unit in the bedroom or living room. In order to conceal these lines, mouldings had to be torn up and walls had to be broken through. Then, too, the water supply pipe would always be more or less cold and in humid weather this line would sweat and cause water on the floor.

Also, since the motor and compressor had to operate quietly because the conditioning unit was located in a living room, the refrigerating machinery had to be placed in a sound-proof cabinet. This cabinet prevented air from flowing over the equipment and as a result motors and compressors got dangerously hot.

Several manufacturers overcame this hot motor chamber by installing a water coil in the mechanism chamber. The water coil was similar to the condenser used on air cooled refrigeration high sides. When used as a water coil, it was connected between the water inlet to the compressor and the water supply line. Thus all the water that passed through the water-cooled compressor had to pass through the water coil first. Thus the water coil was held at a comparatively low temperature and as a result, the water absorbed heat from the motor com-

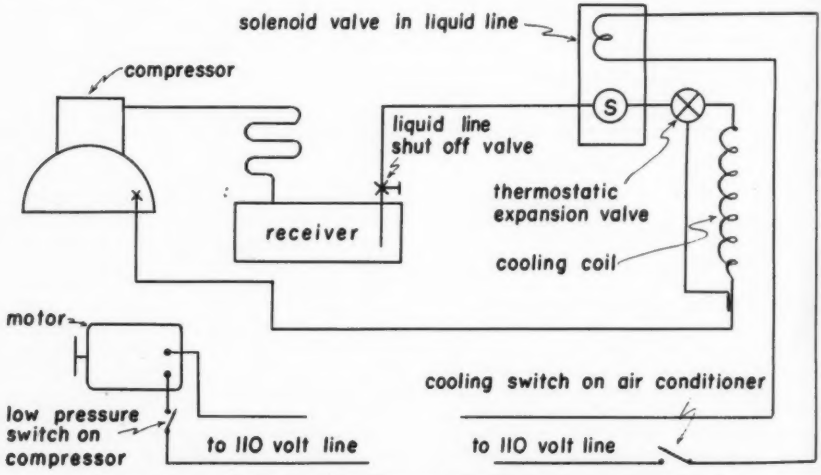


FIG. 1. DIAGRAM OF AIR CONDITIONER FOR SUMMER COOLING.

When cooling switch is closed, the solenoid valve opens and allows liquid refrigerant to enter the cooling coil. The pressure from the refrigerant causes the low pressure switch on the compressor to start the refrigerating machine motor. Then, when the cooling switch is turned off, the solenoid valve closes and prevents more refrigerant from entering cooling coil. Compressor operates several minutes before low pressure switch stops the machine.

partment and this tended to keep the mechanism cool.

One manufacturer developed a refrigerating mechanism which had a zigzag length of three-eighths inch tubing *sweated to the motor frame itself.* Then this tubing was connected in series with the water supply line to the water-cooled compressor. Water flowing through this zigzag tubing absorbed heat from the motor and thus protected it from burning out due to the heat in the sound-proof mechanism compartment.

In many localities, water is very expensive. Under these conditions, water-cooled machines are too expensive to operate and only air-cooled jobs can be sold successfully.

Most manufacturers have realized the drawbacks of water-cooled air conditioners especially in the smaller so called portable types. Most machines today are really portable in that no water or drain connections are required.

Engineers have found that by placing the air conditioner in front of a window and then running a duct from the conditioner to the window, and hooking a large fan onto the refrigerating motor, that sufficient air can be drawn into the unit to remove the required heat from the condenser. At the same time this air removes heat from the motor and compressor, thus preventing overheated sticking parts.

The air duct is generally divided by a sheet of some material so that it forms two separate ducts. Fresh air passes into the conditioner through one duct and heat laden air passes out of the conditioner through the other duct.

Condensate

In air conditioning equipment, the cooling coil is seldom held at a temperature below freezing. Then as warm air is passed over the cold cooling coil and the air is chilled and gives up some of its moisture, the moisture does not freeze to the cooling coil as it does in an ordinary refrigerator. Rather the moisture drips from the cooling coil into a pan which is located under the *cooling* coil. Now a small one-half hp. air conditioner will often extract as much as *one pint* of moisture per hour from the air on humid days so that the condensate collects rapidly in the condensate pan, and some method must be employed to remove this condensate from the conditioner.

Where it is possible, a gravity drain can be installed which will carry the condensate away from the conditioner as fast as it is formed. When a gravity drain cannot be used, some manufacturers allow the condensate to collect in the condensate pan and instruct the customer to empty the pan once or twice a day.

But this method of getting rid of condensate is a nuisance. Oftentimes the customer will forget to empty the pan and then the condensate will flood over onto the floor and damage rugs and room furnishings. Some jobs are equipped with a safety switch which automatically shuts off the conditioner when the water level in the condensate pan becomes too high. But this method isn't very satisfactory either because oftentimes the conditioner will be shut off when it is needed most.

On these jobs where a gravity drain cannot be obtained, a small suction pump can be bought which will successfully suck the water out of the condensate pan and discharge it into a remote drain. By rigging up a float switch in the condensate pan, the pump can be made to operate automatically.

One leading manufacturer uses a novel way of ridding the conditioner of condensate. Instead of using power to remove condensate, the condensate is used to increase the efficiency of the entire conditioning unit. This method is made possible by a simple placement of parts.

A large fan type flywheel is installed on the motor shaft in such a position that it sets in the condensate pan. When condensate drains into the pan, the flywheel rests in the condensate. Then when the motor is running, the flywheel flings the water against the condenser which is located in front of the fan. When the water hits the hot condenser, it is turned into vapor and is carried out of the unit into the outside by air from the flywheel fan. Since every pound of water which is vaporized at room temperature absorbs 1050 B.t.u.'s, the use of this method of condensate removal increases the condenser capacity of the machine and thus increases the efficiency of the entire unit. The condenser used on this machine is really an evaporative condenser.

How the Cooling Circuit Is Controlled

On most portable as well as built-in room conditioners, the evaporation of the cooling phase is controlled by a refrigerant solenoid valve in the liquid line of the unit. The solenoid valve is wired to the cooling switch so that when the switch is turned on, liquid refrigerant passes through the solenoid valve to the thermostatic expansion valve and then

to the cooling coil. When the cooling switch is turned off, the refrigerant solenoid valve closes and prevents any more liquid from entering the cooling coil. The machine continues to run until the compressor has pumped down the cooling coil sufficiently to make the low pressure switch on the compressor stop the motor. The cooling circuit diagram of a conventional self-contained air-conditioner is shown in Fig. 1.

Most room coolers are designed for continuous operation during the cooling season and it is not intended that they cycle. In fact many manufacturers are leaving off the low side switch and instead are controlling the refrigerant circuit by a switch connected directly to the compressor itself.

Several years ago it was the practice to hook up air conditioning equipment with thermostats and humidistats (humidistats are switches that are operated by humidity in a room) to attempt to maintain uniform temperature and properly humidify a room. Although this practice is absolutely necessary in many industrial installations where the product to be manufactured must be kept at fixed temperature and humidity conditions, this practice is not pleasing from a comfort condition. This is so because the outside air conditions affect the way in which a person reacts in a conditioned room. For instance, if the outside temperature and relative humidity are respectively 85 degrees and 75 per cent and the inside conditions are 70 degrees and 60 per cent, a person walking into this room will get a shock and will actually feel cold for a long time after entering the room. Now since the outside air conditions are constantly changing during the day, the inside conditions can not be set to accurately maintain comfortable conditions at all times. Hence, manufacturers have found that it is best to supply equipment which is manually controlled throughout than to attempt to maintain certain fixed conditions in the room. In this way, the customer can operate the unit to provide conditions to suit himself. The use of manual controls eliminates many needless service calls.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box." The following questions are answered by Mr. George H. Clark.

AIR CONDITIONING

Question 196. (1) Why is it that atmospheric air containing water vapor has less weight per cubic foot than air which contains no water vapor?

(2) How much sensible heat is taken out of 20 lbs. of dry air from 90° to 70° F.?

(3) Does the addition of moisture to air increase or decrease the specific heat of air, and what is meant by dew-point depression?

(4) What is the difference between ventilation and air conditioning?

Answer: Atmospheric air containing water vapor has less weight per cubic foot than dry air since water vapor is lighter than air, so that a combination of water vapor and air is lighter than air alone.

The amount of sensible heat taken out of 20 pounds of dry air in being chilled from 90 degrees to 70 degrees can be found by multiplying the number of pounds of dry air by the difference in temperature by the specific heat. The specific heat for air is .24 so this would be 20 x 20 x .24 or 96 B.t.u.'s.

The addition of moisture to air does increase the specific heat of the air as we usually give the specific heat of air in terms of B.t.u.'s to raise the temperature of one pound of air one degree, and this for dry air is .24 B.t.u.'s. If we add moisture to air we actually have one pound of air plus the additional moisture. We have the combined weight of the pound of dry air plus the additional moisture, and to change the temperature of the moisture and the air requires more heat to be removed, or added, to cause the same temperature change as is required for dry air.

I am not exactly sure what you are referring to by dew-point depression. Perhaps by this you mean the amount by which the dew point is lower than dry bulb temperature. This might also be taken as the

amount by which the dew-point is lower than the wet bulb temperature, or in referring to the performance of an air conditioner, as the change in dew-point through a cooling or drying unit.

Ventilation consists in the circulation and supplying of fresh air in a building, while air conditioning is concerned with ventilation and in addition the cleansing of air by filtering or washing and also with controlling the moisture content or humidity of the air as well as controlling the temperature of the air.

An air conditioning job for summer consists in circulating, filtering, cooling, and dehumidifying air. In the winter time it consists in circulating, filtering, heating and adding moisture to the air.

TRACER CHEMICALS

Question 197. Kindly inform us as to what chemicals may be used as tracer in CO_2?

Answer: Oil of peppermint has been used as a tracer in CO_2 refrigerating systems. The procedure is to put from one-half to one ounce of the oil of peppermint in a fairly large refrigerating system, and this will give sufficient odor so that leaks may be detected by the odor.

Other gases might be put in with the CO_2 to give an odor and also to give a smoke test when the tracer gas united with a leak detector gas at a leaking connection.

I believe the oil of peppermint would be most suitable, if I understand your question correctly.

FISHING BOAT INSTALLATIONS

Question 198. We are going to make two refrigerating installations on board two sail fishing boats for the purpose of carrying back stored, fresh codfish during a five to six months fishing trip.

Each installation consists of 3 rooms and is intended to store about 20 tons of fish and refrigerate it from 0 degrees C. to —10 degrees C.

We are going to equip each installation with a Universal Cooler condensing unit, type W-300FL and with fin evaporators having a total radiating surface of 121, 5 square meters, with nearly 200 linear meter of three-quarter inch copper tubing pure tinned.

We would like to know what is your suggestion about the position in which the condensing unit should be installed, having in view a maximum 40 degree tilting angle of the sail boat, and if there is possibility of damage to the bearings of the electric motor, or the level of the liquid receiver being too much out of level, leaving most part of the liquid refrigerant to only one side of the receiver.

Also, in your opinion, what is a more efficient and less expensive defrosting system that you would recommend for a refrigeration installation of this nature? Would a spray of salt water (sea water) be effective in this case? The refrigeration system we intend to use is the direct-expansion type with all copper fin-type evaporators.

Answer: I believe the system such as you have outlined should work very nicely and I would suggest that you be sure to use a vertical receiver with your refrigerating machine rather than a horizontal receiver.

It may be that the Universal Cooler condensing unit has a vertical receiver. I am not very familiar with these model numbers. If a vertical receiver is used with the liquid valve at the bottom of the receiver the boat could tilt a full 45 degrees and still supply liquid refrigerant to the liquid line.

I do not believe that the bearings of the electric motor will give you any trouble due to this tilting of the machine. I would think that possibly the most likely place for trouble might be in the compressor passing an extra amount of oil, if the compressor is tilted considerably, but I doubt if this would give any real trouble.

The salt water spray, which you suggest, I believe would be your most practical method of defrosting since you are going to maintain subfreezing temperatures at all times.

EXCESSIVE VIBRATION

Question 199. Can you give any information as to the cause of excessive vibration in a domestic "Shelvador" refrigerator?

The machine was shipped from one location to another by rail. I was called in to check the machine after it had been set up. From information obtained, it had not been crated properly, and had lost some oil through the shaft seal.

The refrigerator cycles all right, maintains proper temperatures and is not excessive in current consumption, but vibrates too much.

Will the loss of oil cause this trouble?

Answer: From the description you give of what happened to the "Shelvador" refrigerator, I would make a guess that since the compressor lost oil through the shaft seal there might have been a leak sometime while the refrigerating machine was in op-

eration and that air may have been drawn into the system, and that an excessively high head pressure may cause the machine to labor and thereby vibrate excessively. It may labor, also, from some other reason such as dry bearings or a sticky cylinder wall in the cylinder. I would suggest that the head pressure be checked and that possibly purging may be necessary. If there is any indication that the seal still leaks it should be repaired and the system recharged with sulphur dioxide and oil.

This may also be caused by improper springing of the condensing unit.

HOLD-OVER REFRIGERATION

Question 200. In connection with a walk-in cooler, operated from a gas engine driven condensing unit (cooler 10 feet x 8 feet x 10 feet high, 3 inch cork, 50 degrees differential, temperature 38 degrees) we would appreciate receiving any information you may be in position to give us on an installation having a hold-over feature while the compressor is shut down for several hours.

Could a hold-over truck plate, or plates, as manufactured by the Dole Refrigerating Co., having a eutectic solution freezing at —6 degrees below, be used to build up a suitable lowside, which would remain 35 degrees to 40 degrees temperature for several hours after the condensing unit was shut down?

How would you calculate the sq. ft. of plate surface required to maintain a difference of 44 degrees between the plates and box temperature?

Answer: In order to obtain a constant temperature of 38 degrees in the walk-in cooler I believe you should try to maintain an average evaporator temperature of not lower than 25 degrees or else your installation is going to be subject to considerable dehydration of your foods. I would say that if a eutectic solution freezing at —6 degrees were used that we would have to use a very small evaporator in order to keep the temperature from going below 35 degrees and this would be done with considerable dehydration of the foods.

I would suggest that a eutectic solution having a freezing temperature of 26 degrees to 28 degrees should be more practical.

The plate coils manufactured by the Dole Refrigerating Company should serve the purpose very nicely.

To figure the amount of plate surface required for normal air circulation I would depend on a heat transfer rate of two B.t.u.'s per degree of temperature difference, per hour, per square foot of plate surface.

I do not have sufficient information to know what the load is on your refrigerator. I might estimate this roughly to be approximately 6000 B.t.u.'s per hour. To figure the amount of plate surface required, the area of the plates should equal 6000 B.t.u.'s per hour, divided by a 42 degree temperature difference and further divided by the factor of two. This would be written as follows:

$$\text{Area} = \frac{6000}{42 \times 2} = 71.5 \text{ square feet}$$

This amount of surface is, of course, extremely small and will undoubtedly cause considerable food dehydration. I would suggest that we use a eutectic solution with a freezing temperature of 28 degrees in which case we would only have a 10 degree temperature difference in which case the area would be as follows:

$$\text{Area} = \frac{6000}{10 \times 2} = 300 \text{ square feet}$$

A 6.5 per cent solution of potassium sulphate or an 8 per cent solution of sodium carbonate have eutectic freezing temperatures of about 28⅓ degrees. An 11.5 per cent solution of potassium nitrate has a eutectic freezing temperature of 26⅔ degrees F.

REBORING AMMONIA COMPRESSOR

Question 201. I have a question pertaining to a two-cylinder 4½ inch bore 4½ inch stroke ammonia compressor which I trust can be answered by your department.

This compressor is in need of reboring and instead of the usual cylinder reboring and oversize pistons, the machine shop suggests grinding the pistons true and then boring out the cylinders large enough to take a chrome nickel sleeve. The sleeve will be about one-eighth inch thick.

Since this practice is followed successfully in automobile work, do you know of any reason why it would not work the same on an ammonia compressor? Also, what clearances should be left between the pistons and cylinders?

You may use this question in your publication, but I would appreciate an answer as soon as possible, as we are anxious to get this compressor fixed up.

Answer: I believe there should be no objection to using a cylinder sleeve in overhauling the compressor which you describe, provided, of course, that the cylinders can

be bored out to the proper size to allow the sleeve to be inserted, without weakening the metal too much at any point. A number of refrigerating compressors, used in low pressure refrigeration, use sleeves which are removable when they become worn or scored.

The clearance between the piston and cylinder in a refrigerating compressor is generally very small and I would suggest that the cylinder diameter be not more than .001 to .0015 of an inch greater than the piston diameter.

MOISTURE

Question 202. If moisture is in SO_2 unit, is it advisable to use Xyolene and how much and what is the procedure after the Xyolene is put in and what is the reaction?

Answer: If we have moisture in an SO_2 refrigerating system the SO_2 and moisture form sulphurous acid which breaks down the oil causing a carbon sludge to form in the system. The Xyolene acts as a solvent for the binder which holds the carbon together in chunks, and seems to break it up into very fine particles so that the carbon circulates as an emulsion in the Xyolene. This does prevent the sticking up of compressors to a great extent. However, I would say that a suitable drier should also be used in order to neutralize the acid which forms as the result of the sulphur and CO_2. Such a drier or corrosion retarder may make use of zinc granules or activated alumina or calcium oxide as a neutralizing agent and such corrosion arresters should be installed in the liquid line of the refrigerating system. We may also remove some moisture from the SO_2 system if we use a drier containing anhydrous calcium chloride in the suction line of the system. I would not use more than one tablespoon of Xyolene in a household system.

HEAD PRESSURES

Question 203. Do you calculate head pressure when evaporators or coils are in use for 10 or 20 minutes, and are cooling, or take reading of high pressure gauge when coils are chilled to temperature required to maintain proper refrigeration?

Answer: If I get your meaning clearly you are interested in knowing when we should read our high pressure gauge to tell us something with respect to whether or not the machine is operating properly.

I would say that the high pressure gauge reading is some indication as to whether or not the machine is working properly under all conditions. If the evaporators are warm and we have a high suction pressure we will pump a considerable quantity of gas through our compressor and condense more than the normal amount of refrigerant. We will have to have an unusually high difference between the condensing temperature and the cooling medium temperature. In general, I would say that the condensing temperature for normal operation should be somewhere between 10 to 30 degrees above the cooling temperature. This temperature difference will depend upon the size of the condenser, the suction pressure, and whether or not the full condenser is being used as a condenser; that is, in some cases with excess refrigerant in the system, part of the condenser might be used as a liquid receiver, and would decrease the amount of condenser surface, which will require an extra high difference between the condensing temperature and the cooling medium temperature and thereby cause an extra high condensing temperature and head pressure.

CONVERTING MACHINE

Question 204. Kindly inform me if I can convert a machine at present charged with F114 to F12 or SO_2 with complete satisfaction.

Answer: I would say that you would meet with very little success in trying to convert a machine at present with F114 to SO_2 or F12. In general, the displacement of the compressor is considerably greater with refrigerants operating at low pressure than with refrigerants operating at higher pressures. F114 boils at approximately 39 degrees while SO_2 boils at about 13 degrees so that the displacement required for SO_2 will not be anywhere near as much as would be required for F114. With the machine direct connected and using SO_2 the machine would have a very high overload with the probability that the motor would refuse to operate for a very long time and would give considerable trouble in throwing out the overload device and if this failed it would undoubtedly burn out the motor. With F12 the displacement should be only about two-fifths of that required for SO_2 so that it would have even less possibility of successfully using F12 than using SO_2.

S S S

W. Contreras,
Arizona.

The Refrigeration Service Engineer has been of great value to us as it contains much useful and timely information. It is our favorite service magazine.

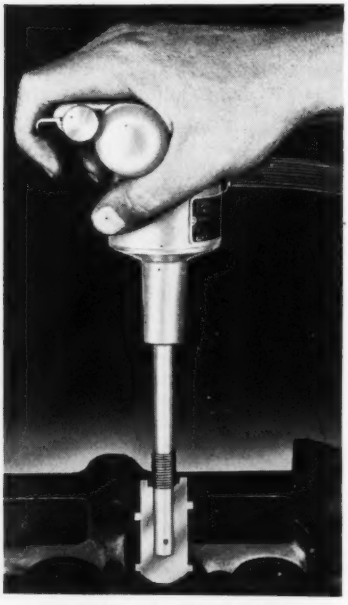
NEW MECHANICAL DEVICES

Service Tools and Special Equipment

Under this heading there will be published illustrated descriptions of new or improved service tools and equipment for the Service Engineer. Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

ALDON PNEUMATIC VALVE GRINDER

A TOOL particularly adaptable for valve grinding on refrigeration compressors is manufactured by the Aldon Products Co. The grinder weighs only 28 ounces, and the tool is so sensitive that the operator feels when the valve is properly seated. The manufacturers claim that it is impossible to "ring" a valve with this grinder.



PNEUMATIC VALVE GRINDER.

The grinder has an infinite number of speeds from 600 to 6,000 strokes per minute, which are instantly obtainable by turning the knurled adjusting screw. In operation, as the valve is rapidly oscillated back and forth, it automatically moves forward one-sixth of a revolution at each stroke. This roto-oscillating movement is essential in generating compression-tight valve seats, free from "valleys" and "high spots." The price of the valve grinding outfit complete is $12.75.

* * *

SOUTH BEND UNDERNEATH BELT MOTOR DRIVE LATHE

THE South Bend Lathe Works, South Bend, Indiana, announce a new line of back-geared, screw cutting, precision lathes in the new Underneath Belt Motor Drive. The new series of lathes are offered in 9, 11, 13, 15 and 16 inch swing, and in bed lengths from 3 to 12 inches.

The new underneath belt motor drive is unusually compact and is silent, powerful, and economical in operation. The motor and driving mechanism are fully enclosed in the cabinet leg underneath the lathe headstock. There are no exposed pulleys, belts, or gears and no overhead belts or pulleys to obstruct vision or cast shadows on the work.

The belt drive is the outstanding feature, as it is silent in operation and provides a smooth steady pull free from vibration and chatter. Power is transmitted from the motor to the countershaft by V-belt, and from the countershaft up through the lathe bed to the headstock cone pulley by a flat leather belt.

Adjustment is provided for taking up belt stretch and for obtaining any desired tension on both the motor belt and cone pulley belt. A belt tension release lever conveniently located on the front of the cabinet leg permits the easy shifting of the cone pulley belt.

The down drive for the spindle will be appreciated by the engineer and mechanic as the pull of the belt is down against the solid portion of the headstock. The reversing motor and reversing switch permit starting, stopping, and reversing the lathe spindle from an easy working position in front of the lathe. The lathe spindle may be instantly reversed when cutting screw threads

by throwing the switch directly from "forward" to "reverse" position.

The new line of South Bend Underneath Belt Motor Driven Precision Lathes have a number of new features and improvements, the most outstanding of which are: heat-treated headstock spindle with all bearing surfaces hardened and ground, including the taper holes; spindles are special alloy steel, with phosphor bronze bearings, line bored and lapped to a perfect bearing and adjustable for wear; new double wall apron with self-oiling steel gears, and all gear shafts supported on both ends; a multiple disc friction clutch in apron; etc.

South Bend Lathes are noted for the number of practical attachments with which they can be equipped for milling, key way cutting, grinding, turning tapers, draw-in collet chuck work, gear cutting, etc., in the tool room, manufacturing plant, and general machine shops. Most of these attachments may be purchased with the lathe or ordered later when needed.

S S S

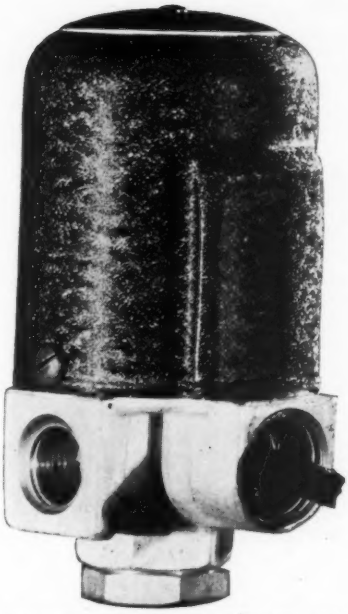
NEW SOLENOID REFRIGERANT VALVE BY AUTOMATIC PRODUCTS CO.

MODEL 73-RB Solenoid Valve, manufactured by the Automatic Products Co., of Milwaukee, Wisc., is designed especially for liquid and suction line control of "Freon," methyl chloride and sulphur dioxide.

One of the features of the construction of this valve is the removable seat assembly. By removing the bottom plug, the seat can be unscrewed, and both seat and needle assembly fall out for easy inspection and cleaning, thus making it unnecessary to remove the valve from the line.

There are several applications for the use of this valve, among which are the control of the flow of refrigerant to individual evaporators, all of which connect to the same compressor unit. This application is utilized in controlling temperatures in several different refrigerators, such as may be found in grocery stores, butcher shops, florist shops, and drug stores. Each storage box is individually controlled, and independent of the other installations.

This same individually controlled system can be used in the air conditioning field where individual evaporators are located in different rooms, all working off a central compressor unit. Cabinets may be added or taken off without disturbing the installation.



AUTOMATIC PRODUCTS SOLENOID VALVE.

On suction line work, which is generally used in butcher shops, grocery stores, florist shops, or other places where a large temperature differential is desired between the various evaporator units, this valve is installed in the return line of the warmer evaporator, and opens and closes as regulated by the thermostat. The display case is governed solely by the expansion valve.

The orifice size of 7/32 of an inch gives this valve capacity up to four tons on "Freon" and up to eight tons on methyl chloride and sulphur dioxide.

S S S

CHICAGO OFFICE OF MINNEAPOLIS-HONEYWELL MOVES

THE Chicago office of Minneapolis-Honeywell Regulator Co. is now located in the entire seventh floor of the Furniture Exhibition Building, at 433 E. Erie St., Chicago. This building is located directly across Erie St. from the American Furniture Mart.

Increased demand upon the staff and stock of the Chicago office has necessitated this move.

NEW BELT CATALOG

THE L. H. Gilmer Company has published a new catalog and data book on replacement belts for electric refrigerators, household washing machines, beer pumps, oil burners, woodworking machines, water pumps and miscellaneous household appliances.

The catalog has been published in two editions, one being the standard 8½ inch x 11 inch size for the use of jobbers and jobbers' salesmen, while the second edition is a 3½ inch x 6½ inch—120 page catalog convenient in size for the use of dealers and service men.

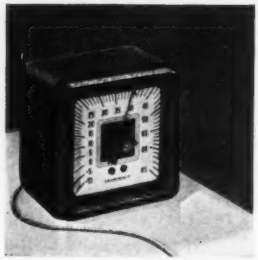
The catalog shows complete listings on a wide range of units in addition to model numbers, manufacturers' part numbers, and the size of the belts recommended.

MARSH "SERVICEMAN" THERMOMETER

JAS. P. MARSH CORP., 2073 Southport Ave., Chicago, manufacturers of precision recording instruments for industry, have recently introduced the Marsh "Serviceman" refrigeration service thermometer. According to the manufacturers, it incorporates several desirable features for service work.

The thermometer is a high-grade vapor tension bourdon-tube type, as used in Marsh instruments. It is enclosed in a trim, sturdy, compact case, completely encircled by a thick rubber ring which prevents scratching the surface on which it rests. A modern dial with clear, one-degree calibrations and a bright red pointer that can be accurately read at a distance comprises the face of the instrument. The capillary tubing is wound on a drum, which is concealed in the back of the case. When in use, it is simply necessary to remove the back cover and then unwind the amount of tubing necessary for reaching the point at which the temperature is to be taken. The tubing is sufficiently slender to pass between the refrigerator door and jamb without marring the door, and it is so effectively armored that it cannot be damaged by the pressure of the door gasket. After use, the tubing can be quickly replaced in the case to form a sturdy, self-contained unit which can be carried in a kit without fear of damage. The crystal, also, is unbreakable.

The thermometer is provided with a Marsh "Recalibrator." If, after an accident, the thermometer is off, you simply place the bulb in a bowl of crushed ice and water and turn the "Recalibrator" screw until the pointer registers 32 degrees. It will then be correct at every point on the dial.



MARSH "SERVICEMAN" THERMOMETER.

The Marsh "Serviceman" is made in four standard types: Type 65a, —10° F. to +65° F.; Type 65b, —10° F. to +100° F.; Type 65c, —20° F. to +40° F.; Type 65d, —20° F. to +65° F.

A new descriptive folder has been prepared, illustrating and describing the various features incorporated in this service thermometer, and if not available at local jobbers, it can be secured direct from the company.

NEW IDEAL SHOWROOM IN NEW YORK FEATURES PRODUCTS IN ACTION

THE removal of their New York office to larger quarters at 61 East Eleventh Street is announced by the Ideal Commutator Dresser Co., Sycamore, Illinois.

The new quarters include a completely equipped showroom with modern all-steel shelves and show-cases on which the Ideal products are displayed in a most effective manner. Features of the showroom are the action displays of Ideal products.

In its announcement, the Ideal Commutator Dresser Co. points out that the move has been made in recognition of the need for better service in the motor maintenance field and is in keeping with the company's progress. The company's Eastern Division Manager, Mr. R. W. Becker, and the District Manager, Mr. F. J. Dreyfuss, invite customers to visit the new showroom and see the latest developments in the motor maintenance field.

Best magazine ever. Keep it up.
E. J. Kerby, Iowa.

Refrigerant and Lubrication Data

for Household Refrigerating Units

By L. K. Wright, Mem. A.S.R.E.

THE following pages provide data for quick and ready reference, covering the more common household models of American units manufactured during the years of 1933, 1934, 1935 and 1936. In a few instances, data on the exact weight of oil and refrigerants was not secured, and space has been left to insert this data when it is available.

In order to condense the data, the following abbreviations have been used:

SO	— Sulphur Dioxide	F21	— F-21
MC	— Methyl Chloride	F114	— F-114
Iso	— Isobutane	MF	— Methyl Formate
F12	— F-12 (Freon)	Car	— Carrene
F14	— F-14	EC	— Ethyl Chloride

The refrigerant charge given in each case is the correct quantity of refrigerant for proper operation. It is not the pump-down capacity of receiver. Oils are specified by weight or volume. It must be borne in mind that the oil must be chosen which is correct for the refrigerant, sulphur dioxide using the lowest viscosity grade.

Under the heading of the make of machine will be found the various models and their data covering each year.

The following is interesting information covering 1526 units listed in these tables including those to be published in July.

YEAR	Units	Sulphur Dioxide	Methyl Chloride	Freon (F-12)	Carrene	F-114	Methyl Formate	Iso Butane	Ethyl Chloride	F-21
1933	425	76¾%	16%	.....	1½%	½%	¾%	1½%	3%	.....
1934	400	74%	17¼%	1¼%	1¼%	1¼%	2%	1½%	.....	.....
1935	404	67%	25%	3%	2¼%	1¼%	.....	.....	.....	1%
1936	297	62%	23%	7½%	3%	4½%	.....	.....	.....	.....
	1526									

The tables have been arranged to fit a standard size data book, which can be secured from THE REFRIGERATION SERVICE ENGINEER for $1.00. This book will accommodate information published in this form from time to time, as well as providing for other data that the service engineer may accumulate.

INFORMATION ON OTHER MACHINES WILL APPEAR IN THE JULY ISSUE

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Apex 1933	**Apex Electrical Mfg. Company 1070 East 152nd Street, Cleveland, Ohio**				
	L-410	SO	1½ lbs.	8 ozs.	1/6
	L-500	SO	4 lbs.	11 ozs.	1/6
	L-600	SO	4½ lbs.	11 ozs.	1/6
	L-610	SO	1½ lbs.	8 ozs.	1/6
	L-800	SO	5 lbs.	11 ozs.	1/6
	P-600	SO	4½ lbs.	11 ozs.	1/6
	P-800	SO	5 lbs.	11 ozs.	1/6
			1934		
	SSL-4	SO	4 lbs.	8 ozs.	1/6
	SSL-45	SO	4 lbs.	8 ozs.	1/6
	L-410	SO	1½ lbs.	8 ozs.	1/6
	L-610	SO	1½ lbs.	8 ozs.	1/6
	L-500	SO	4 lbs.	11 ozs.	1/6
	L-600	SO	4½ lbs.	11 ozs.	1/6
	P-600	SO	4½ lbs.	11 ozs.	1/6
	L-800	SO	5 lbs.	12 ozs.	1/6
	P-800	SO	5 lbs.	12 ozs.	1/6
	SSL-6	SO	4½ lbs.	8 ozs.	1/6
	DTL-6	SO	4½ lbs.	11 ozs.	1/6
	SSL-7	SO	5 lbs.	8 ozs.	1/6
	DTL-7	SO	5 lbs.	12 ozs.	1/6
	DTL-8	SO	5¼ lbs.	12 ozs.	1/6
			1935		
	740	SO	4 lbs.	7 ozs.	1/6
	745	SO	4 lbs.	7 ozs.	1/6
	760	SO	4½ lbs.	7 ozs.	1/6
	DTL-6	SO	4½ lbs.	11 ozs.	1/5
	DTL-7	SO	5 lbs.	11 ozs.	1/5
	DTL-8	SO	5¼ lbs.	11 ozs.	1/5
	SSL-6	SO	4½ lbs.	7 ozs.	1/6
	SSL-7	SO	5 lbs.	7 ozs.	1/5
			1936		
	A-430	SO	4½ lbs.	10 ozs.	1/6
	A-600	SO	4½ lbs.	10 ozs.	1/5
	A-650	SO	4½ lbs.	10 ozs.	1/5
	A-785	SO	5¼ lbs.	14 ozs.	1/5
Atwater Kent 1935	**Atwater Kent Mfg. Co. 4700 Wissahickon Ave., Philadelphia, Pa.** (Now inactive in refrigeration units)				
	R-256	MC	1 lb.	5 ozs.	1/6
	R-334	MC	1 lb.	5 ozs.	1/6
	R-547	MC	1 lb.	5 ozs.	1/6
	R-615	MC	1 lb.	5 ozs.	1/6
Belleville 1933	**Belleville Refrigeration Co. 21 Florida St., Belleville, Ill.** (These units also sold under name of Modern and North Pole.) Now out of business.				
	51	SO	7 lbs.	12 ozs.	1/6
	L-51	SO	7 lbs.	12 ozs.	1/6
	61	SO	7 lbs. 8 ozs.	14 ozs.	1/6
	72	SO	7 lbs. 8 ozs.	14 ozs.	1/4
	81	SO	8 lbs. 8 ozs.	1 lb.	1/4
	92	SO	8 lbs. 8 ozs.	1 lb.	1/4

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Buckeye 1935	**Domestic Industries, Inc. Mansfield, Ohio (Now inactive in manufacture of refrigeration units)**				
	600	SO	2 lbs.	.....	1/6
			1936		
	800	SO	25 ozs.	.....	1/6
Cavalier 1933-1934	**Tennessee Furniture Corp. 343 West Place, Chattanooga, Tenn. (Compression unit manufactured by Sunbeam Electrical Mfg. Co., Evansville, Ind.)**				
	101	SO	2 lbs.	1 pt.	1/6
	111	SO	2 lbs.	1 pt.	1/6
	112	SO	2 lbs.	1 pt.	1/6
	119	SO	2 lbs.	1 pt.	1/6
	121	SO	2 lbs.	1 pt.	1/6
	122	SO	2 lbs.	1 pt.	1/6
	131	SO	2 lbs.	1 pt.	1/6
	132	SO	2 lbs.	1 pt.	1/6
	141	SO	2 lbs.	1 pt.	1/5
	142	SO	2 lbs.	1 pt.	1/5
	152	SO	2 lbs.	1 pt.	1/5
Challenger & Lectrik-Ice 1934	**Uniflow Mfg. Company Erie, Pa. (See Lectrik-Ice)**				
	S45	SO	3¼ lbs.	250 grams	1/6
	S60	SO	4 lbs.	250 grams	1/6
	D42	SO	1¼ lbs.	250 grams	1/6
	P42	SO	1¼ lbs.	250 grams	1/6
	D52	SO	1¼ lbs.	750 grams	1/6
	P52	SO	1¼ lbs.	750 grams	1/6
	D63	SO	1¼ lbs.	750 grams	1/6
	P63	SO	1¼ lbs.	750 grams	1/6
	D84	SO	1½ lbs.	750 grams	1/5
	P84	SO	1½ lbs.	750 grams	1/5
	P105	SO	3 lbs.	1000 grams	1/4
Chilrite 1933	**Narragansett Machine Co. Vale St., Pawtucket, Rhode Island**				
	L-4	SO	4½ lbs.	1 qt.	1/6
	LP-48	SO	4½ lbs.	1 qt.	1/6
	L-5	SO	5 lbs.	1 qt.	1/6
	L-6	SO	5 lbs.	1 qt.	1/6
	P-4	SO	4½ lbs.	1 qt.	1/6
	P-5	SO	5 lbs.	1 qt.	1/6
	P-6	SO	5 lbs.	1 qt.	1/6
			1934		
	LP48	SO	4½ lbs.	1 qt.	1/6
	L4	SO	4½ lbs.	1 qt.	1/6
	P4	SO	4½ lbs.	1 qt.	1/6
	L5	SO	5 lbs.	1 qt.	1/6
	P5	SO	5 lbs.	1 qt.	1/6
	L6	SO	6 lbs.	1 qt.	1/6
	P6	SO	6 lbs.	1 qt.	1/6

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Coldspot 1933	**Sears, Roebuck & Co. Chicago, Ill.**				
(Refrigeration units manufactured by Sunbeam Electric Mfg. Co., Evansville, Ind.)					
	440-C	SO	1 lb. 14 ozs.	1 pt.	1/6
	450-C	SO	1 lb. 14 ozs.	1 pt.	1/5
	460-C	SO	1 lb. 14 ozs.	1 pt.	1/4
	470-C	SO	1 lb. 14 ozs.	1 pt.	1/4
	640-C	SO	1 lb. 14 ozs.	1 pt.	1/6
	850-C	SO	1 lb. 14 ozs.	1 pt.	1/5
	440-CP	SO	1 lb. 14 ozs.	1 pt.	1/6
	450-CP	SO	1 lb. 14 ozs.	1 pt.	1/5
	460-CP	SO	1 lb. 14 ozs.	1 pt.	1/4
	470-CP	SO	1 lb. 14 ozs.	1 pt.	1/4
	740-CP	SO	1 lb. 14 ozs.	1 pt.	1/6
			1934		
	940 C (JS)	SO	1½ lbs.	1 pt.	1/6
	860 C (K or KC)	SO	1½ lbs.	1 pt.	1/5
	660 CP (K or KC)	SO	1½ lbs.	1 pt.	1/5
	670 CP (L or LC)	SO	1½ lbs.	1 pt.	1/4
	950 C (KS)	SO	1½ lbs.	1 pt.	1/5
	960 C (KS or KCS)	SO	1½ lbs.	1 pt.	1/5
			1935		
	104	SO	1 lb. 14 ozs.	1 pt.	1/6
	105	SO	1 lb. 14 ozs.	1 pt.	1/5
	106	SO	1 lb. 14 ozs.	1 pt.	1/5
	114	SO	1 lb. 14 ozs.	1 pt.	1/6
	216	SO	1 lb. 14 ozs.	1 pt.	1/5
	326	SO	1 lb. 14 ozs.	1 pt.	1/5
	328	SO	1 lb. 14 ozs.	1 pt.	1/4
			1936		
	7516	SO	1 lb. 14 ozs.	¾ pt.	1/6
	7517	SO	1 lb. 14 ozs.	¾ pt.	1/6
	7518	SO	1 lb. 14 ozs.	¾ pt.	1/5
	7519	SO	1 lb. 14 ozs.	¾ pt.	1/5
	7520	SO	1 lb. 14 ozs.	¾ pt.	1/4
	7521	SO	1 lb. 14 ozs.	¾ pt.	1/4
Copeland 1933	**Copeland Refrigeration Corp. 1331 Holden Ave., Detroit, Mich.**				
	P-6	MC	5½ ozs.	100 cc	1/6
	P-7	MC	5½ ozs.	100 cc	1/6
	P-11	MC	5½ ozs.	100 cc	(2) 1/6
	W-6	MC	5½ ozs.	100 cc	1/6
	W-7	MC	5½ ozs.	100 cc	1/6
	W-42	MC	5½ ozs.	100 cc	1/6
	W-52	MC	5½ ozs.	100 cc	1/6
			1934		
	454	MC	1 lb.	⅝ pt.	1/6
	L604	MC	1 lb.	⅝ pt.	1/6
	P604	MC	1 lb.	⅝ pt.	1/6
	L704	MC	1 lb.	⅝ pt.	1/6
	P704	MC	1 lb.	⅝ pt.	1/6
	L854	MC	1 lb.	⅝ pt.	1/5
	P854	MC	1 lb.	⅝ pt.	1/5

Copeland—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
COPELAND—*Continued from Preceding Page*					
			1935		
	505	MC	1¼ lbs.	⅞ pt.	1/6
	635	MC	1¼ lbs.	⅞ pt.	1/6
	755	MC	1¼ lbs.	⅞ pt.	1/6
	955	MC	1¼ lbs.	⅞ pt.	1/5
			1936		
	436	MC	1 lb.	⅞ pt.	1/6
	736	MC	1 lb.	⅞ pt.	1/6
	936	MC	1 lb.	⅞ pt.	1/5
Crosley 1933	**Crosley Radio Corp. Arlington St., Cincinnati, Ohio**				
	D-35	SO	21 ozs.	15 ozs.	1/8
	D-45	SO	28 ozs.	15 ozs.	1/6
	D-60	SO	34 ozs.	15 ozs.	1/6
	Note: Same models produced in 1932.				
			1934		
	EA35	SO	31 ozs.	15 ozs.	1/6
	EA43	SO	34 ozs.	15 ozs.	1/6
	EA55	SO	38 ozs.	15 ozs.	1/6
	E43	SO	34 ozs.	15 ozs.	1/6
	E55	SO	38 ozs.	15 ozs.	1/6
	E70	SO	42 ozs.	15 ozs.	1/5
			1935		
	F-43	SO	30 ozs.	15 ozs.	1/6
	F-55	SO	29 ozs.	15 ozs.	1/6
	F-70	SO	32 ozs.	15 ozs.	1/5
	FA-20	SO	24 ozs.	13 ozs.	1/6
	FA-30	SO	28 ozs.	15 ozs.	1/6
	FA-35	SO	29 ozs.	15 ozs.	1/6
	FA-40	SO	29 ozs.	15 ozs.	1/6
	FA-50	SO	30 ozs.	15 ozs.	1/6
	FA-60	SO	29 ozs.	15 ozs.	1/6
	FA-70	SO	32 ozs.	15 ozs.	1/6
	FR-20	F-21	20 ozs.	10 ozs.	1/6
	FR-30	F-21	28 ozs.	10 ozs.	1/6
	FR-35	F-21	28 ozs.	10 ozs.	1/6
	FR-40	F-21	28 ozs.	10 ozs.	1/6
	PF-43	SO	30 ozs.	15 ozs.	1/6
	PF-55	SO	29 ozs.	15 ozs.	1/6
	PF-70	SO	32 ozs.	15 ozs.	1/5
	PFA-50	SO	30 ozs.	15 ozs.	1/6
	PFA-60	SO	29 ozs.	15 ozs.	1/6
	PFA-70	SO	32 ozs.	15 ozs.	1/6
			1936		
	GAT-43	SO	34 ozs.	25 ozs.	1/8
	GAT-50	SO	35 ozs.	25 ozs.	1/8
	GAT-60	SO	37 ozs.	25 ozs.	1/8
	GAT-70	F-12	37 ozs.	25 ozs.	1/5
	GAQ-30	SO	28 ozs.	10 ozs.	1/6
	GAQ-35	SO	28 ozs.	10 ozs.	1/6
	GAQ-43	SO	30 ozs.	10 ozs.	1/6
	GAQ-50	SO	31 ozs.	10 ozs.	1/6
	GAQ-60	SO	34 ozs.	10 ozs.	1/6
	GAQ-70	SO	34 ozs.	10 ozs.	1/6

Crosley—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
CROSLEY 1936—*Continued from Preceding Page*					
	GKQ-43	SO	30 ozs.	10 ozs.	1/6
	GKQ-50	SO	31 ozs.	10 ozs.	1/6
	GKQ-60	SO	34 ozs.	10 ozs.	1/6
	GKQ-70	SO	34 ozs.	10 ozs.	1/6
	GKT-43	SO	34 ozs.	25 ozs.	1/8
	GKT-50	SO	35 ozs.	25 ozs.	1/8
	GKT-60	SO	37 ozs.	25 ozs.	1/8
	GKT-70	F-12	37 ozs.	25 ozs.	.15
	PGKQ-50	SO	31 ozs.	10 ozs.	1/6
	PGKQ-60	SO	34 ozs.	10 ozs.	1/6
	PGKQ-70	SO	34 ozs.	10 ozs.	1/6
	PGKT-50	SO	35 ozs.	25 ozs.	1/8
	PGKT-60	SO	37 ozs.	25 ozs.	1/8
	PGKT-70	F-12	37 ozs.	25 ozs.	.15
(The models given as charged with F-12 were alternated wih charges of F-21)					
Dayton (& Niagara) Heinz & Munschauer					
1933			**20 Superior St., Buffalo, N. Y.**		
	4-A-2	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	5-A-2	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	6-A-2	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	8-A-3	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	2-N-4	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	2-N-5	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	2-N-6	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	3-N-6	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	3-N-8	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	6310-WP	SO	4 lbs. 6 ozs.	1½ pts.	1/6
Note: Same models produced in 1932.					
1934					
	4-A-2	SO	3 lbs. 6 ozs.	½ pt.	1/6
	5-B-2	SO	3 lbs. 6 ozs.	½ pt.	1/6
	6-B-3	SO	4 lbs. 6 ozs.	½ pt.	1/6
	7-B-4	SO	5 lbs.	½ pt.	1/6
	8-B-4	SO	5 lbs.	½ pt.	1/6
	283-P	SO	4 lbs. 6 ozs.	½ pt.	1/6
	5-A-2	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	6-A-2	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	8-A-3	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	2-N-4	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	2-N-5	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	2-N-6	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	3-N-6	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	3-N-8	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	6301-WP	SO	4 lbs. 6 ozs.	1½ pts.	1/6
1935					
	4-C-2	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	5-C-2	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	6-C-3	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	7-C-4	SO	4 lbs. 6 ozs.	1½ pts.	1/6
	8-C-4	SO	5 lbs. 6 ozs.	1½ pts.	1/6
1936					
	4-S-2	SO	2 lbs.	22 ozs.	1/6
	5-S-2	SO	2 lbs.	22 ozs.	1/6
	6-S-2	SO	2 lbs.	22 ozs.	1/6
	6-D-3	SO	2 lbs.	22 ozs.	1/6
	7-D-4	SO	2 lbs.	22 ozs.	1/6
	8-D-4	SO	2 lbs.	22 ozs.	1/4
Compressors were manufactured by Tecumseh Products Co., known as "Chieftain." Some "Chieftain" units were charged with methyl chloride.					

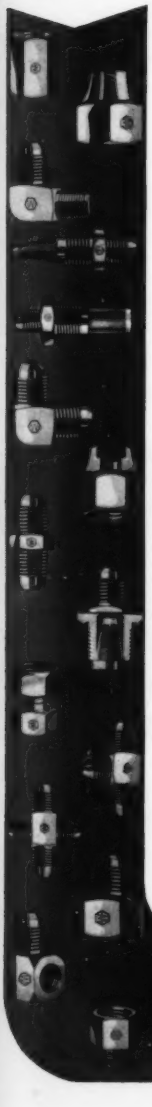
Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Electro-Kold Corp. 1936			E. S. Matthews, Inc. 151 South Post St., Spokane, Washington		
	42	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	55	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	72	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	86	MC	1 lb. 8 ozs.	⅔ pt.	1/5
	99	MC	1 lb. 8 ozs.	⅔ pt.	1/5
Fairbanks-Morse 1934			Fairbanks, Morse & Co. Indianapolis, Ind.		
	AL-4	SO	25 ozs.	12 ozs.	1/5
	AL-5	SO	25 ozs.	12 ozs.	1/5
	AL-6	SO	25 ozs.	12 ozs.	1/5
	AP-5	SO	25 ozs.	12 ozs.	1/5
	AP-6	SO	25 ozs.	12 ozs.	1/5
			1935		
	B-4	SO	1½ lbs.	1 lb.	1/6
	B-5	SO	1½ lbs.	1 lb.	1/6
	B-6	SO	1½ lbs.	1 lb.	1/6
	B-8	SO	1½ lbs.	1 lb.	1/5
	B-6S	SO	1½ lbs.	1 lb.	1/5
			1936		
	B-4	SO	1 lb. 8 ozs.	16 ozs.	1/6
	B-5	SO	1 lb. 8 ozs.	16 ozs.	1/6
	B-6	SO	1 lb. 8 ozs.	16 ozs.	1/6
	B-6S	SO	1 lb. 8 ozs.	16 ozs.	1/5
	B-8	SO	1 lb. 8 ozs.	16 ozs.	1/5
	C-4	SO	1 lb. 8 ozs.	16 ozs.	1/6
	C-4A	SO	1 lb. 8 ozs.	16 ozs.	1/6
	C-5	SO	1 lb. 8 ozs.	16 ozs.	1/6
	C-6	SO	1 lb. 8 ozs.	16 ozs.	1/6
	C-6S	SO	1 lb. 8 ozs.	20 ozs.	1/5
	C-7	SO	1 lb. 8 ozs.	20 ozs.	1/5
Federal 1936			Federal Refrigerator Corp. 57 East 25th St., New York City		
	4-S	SO	3 lbs.	1 pt.	1/6
	6-S	SO	3 lbs.	1 pt.	1/6
	66-S	SO	3 lbs.	1 pt.	1/6
	91-S	SO	3 lbs.	1 pt.	1/5
	(This unit assembly included Jomoco compressors.)				
Frigidaire 1933			Frigidaire Corp. Dayton, Ohio		
	Std.-43	F-114	⅞ lb.	7 ozs.	1/20
	Std.-63	F-114	1 lb.	7 ozs.	1/20
	SL-43	SO	2⅛ lbs.	17 ozs.	1/6
	SL-63	SO	2⅛ lbs.	17 ozs.	1/6
	SL-73	SO	2¼ lbs.	17 ozs.	1/5
	Super-43	SO	2⅛ lbs.	17 ozs.	1/6
	Super-63	SO	2¼ lbs.	17 ozs.	1/5
	Super-73	SO	2¼ lbs.	17 ozs.	1/5
	Super-93	SO	2⅞ lbs.	15 ozs.	1/4
	Super-123	SO	3¼ lbs.	15 ozs.	1/4
	Super-153	SO	3½ lbs.	15 ozs.	1/3

Frigidaire—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
FRIGIDAIRE—*Continued from Preceding Page*					
		1934			
Master 434	SO	2⅛ lbs.	⅞ lb.		1/6
Master 634	SO	2⅛ lbs.	⅞ lb.		1/5
Master 834	SO	2⅝ lbs.	⅞ lb.		1/4
Standard 634	F114	1⅛ lbs.	7 ozs.		1/16
Standard 534	F114	1⅛ lbs.	7 ozs.		1/16
Standard 434	F114	1 lb.	7 ozs.		1/20
DeLuxe 1234	SO	3½ lbs.	1 lb.		1/3
DeLuxe 1534	SO	3½ lbs.	1 lb.		1/3
Super 1534	SO	3¼ lbs.	1 lb.		1/3
Super 1234	SO	3¼ lbs.	1 lb.		1/4
Super 934	SO	2⅞ lbs.	1 lb.		1/4
Super 734	SO	2⅝ lbs.	⅞ lb.		1/5
Super 634	SO	2⅝ lbs.	⅞ lb.		1/5
Super 434	SO	2⅛ lbs.	⅞ lb.		1/6
WP18-34	SO	12½ lbs.	56 ozs.		1/3
SL3-63	SO	2⅛ lbs.	17 ozs.		1/5
SL2-63	SO	2⅛ lbs.	17 ozs.		1/5
SM4-34	SO	2⅛ lbs.	17 ozs.		1/6
DM4-34	SO	2⅛ lbs.	17 ozs.		1/6
R-4	F-114	⅞ lb.	7 ozs.		1/20
Koldchest	F-114	⅞ lb.	7 ozs.		1/20
		1935			
Koldchest	F-114	11 ozs.	7 ozs.		1/20
D3-35	F-114	14½ ozs.	7 ozs.		1/20
Std. 4-35	F-114	17 ozs.	7 ozs.		1/16
Std. 5-35	F-114	20 ozs.	7 ozs.		1/12
Std. 6-35	F-114	20 ozs.	7 ozs.		1/12
Delux 12-35	SO	3 lbs. 8 ozs.	16 ozs.		1/3
Delux 15-35	SO	3 lbs. 8 ozs.	16 ozs.		1/3
Master 4-35	SO	2 lbs. 2 ozs.	14 ozs.		1/6
Master 5-35	SO	2 lbs. 6 ozs.	10 ozs.		1/5
Master 6-35	SO	2 lbs. 6 ozs.	10 ozs.		1/5
Master 8-35	SO	2 lbs. 10 ozs.	14 ozs.		1/5
Super 5-35	SO	2 lbs. 6 ozs.	10 ozs.		1/5
Super 6-35	SO	2 lbs. 6 ozs.	10 ozs.		1/5
Super 7-35	SO	2 lbs. 10 ozs.	14 ozs.		1/5
Super 9-35	SO	2 lbs. 14 ozs.	16 ozs.		1/4
Super 12-35	SO	3 lbs. 4 ozs.	16 ozs.		1/4
Super 15-35	SO	3 lbs. 8 ozs.	16 ozs.		1/3
WP18-35	SO	12 lbs. 8 ozs.	56 ozs.		1/3
		1936			
Koldchest	F-114	14 ozs.	7 ozs.		1/16
D3-36	F-114	15 ozs.	7 ozs.		1/16
DR55-36	F-114	19 ozs.	7 ozs.		1/12
DR55-36	F-114	19 ozs.	7 ozs.		1/12
M4-36	F-114	18 ozs.	7 ozs.		1/16
M5-36	F-114	19 ozs.	7 ozs.		1/12
M6-36	F-114	19 ozs.	7 ozs.		1/12
M7-36	F-114	23 ozs.	7 ozs.		1/7
S4-36	F-114	18 ozs.	7 ozs.		1/16
S5-36	F-114	19 ozs.	7 ozs.		1/12
S6-36	F-114	19 ozs.	7 ozs.		1/12
S7-36	F-114	23 ozs.	10 ozs.		1/7
S9-36	F-114	26 ozs.	10 ozs.		1/7
WP12-36	F-12	54 ozs.	16 ozs.		1/3
WP15-36	F-12	58 ozs.	16 ozs.		1/3
Premier	F-12	58 ozs.	16 ozs.		1/3
Imperial	F-12	58 ozs.	16 ozs.		1/3

Refrigerant and Oil Information—Continued on Page 45

WHATEVER YOU WANT IN A VALVE OR FITTING WEATHERHEAD HAS IT



YOU only need to see Weatherhead parts to realize that these are *better* valves and fittings. Just ask your jobber.

The New Weatherhead Refrigeration Catalog is ready. Write for your copy.

WEATHERHEAD

Refrigeration Valves and Fittings

THE WEATHERHEAD COMPANY
CLEVELAND, OHIO

FEDDERS

the Right Va

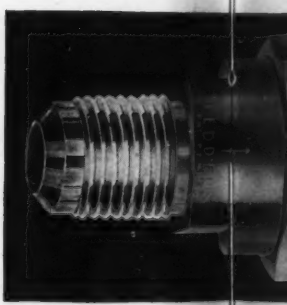
EVERY NE

THERMOSTATIC EXPANSION VALVE

Gives easy, sensitive adjustment, accurate refrigerant control and dependable performance in the field.

AUTOMATIC EXPANSI

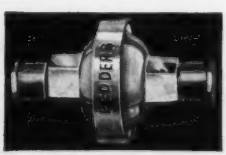
The Fedders Model 640 Autom Valve offers the refrigeration results of years of engineering an rience.



CHECK VALV

For multiple installations to keep t the warmer evaporator from back evaporator.

CARTRIDGE-TYPE NEEDLE-SEAT ASSEMBLY



In spite of the extreme care which is used at the factory to assure a clean system, there are so many factors beyond human control that it is low cost insurance to always install a Fedders Filter on the Liquid Line of every job, both domestic and commercial.

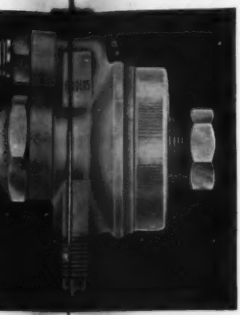
Model 6586 above
Model 7150 below

Fedders Dehydrators consist of a brass cylinder equipped with Fedders filter cells at each end and space between for a liberal charge of standard drying agent.

Engineered to Give Service

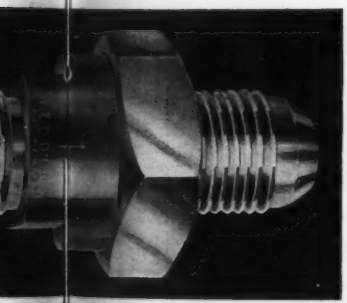
ARE YOU GETTING YOUR COPY OF THE FEDDERS NEW

ERS Gives You
igh Valve for
RY NEED . . .



MATIC EXPANSION VALVE

dders Model 1940 Automatic Expansion offers the refrigeration industry the re- years of engineering and service expe-



CHECK VALVE

tallations to keep the high pressure gas in porator from backing up into the colder

CONSTANT PRESSURE VALVE

Refrigeration men are welcoming the Fedders Model CP-35 Constant Pressure Valve as a simple, easily installed, economical and extremely accurate means of controlling each unit in a multiple system with cooling units necessarily operating at various loads and temperatures.

Heat Transfer Specialists Since 1896

FEDDERS MANUFACTURING CO.

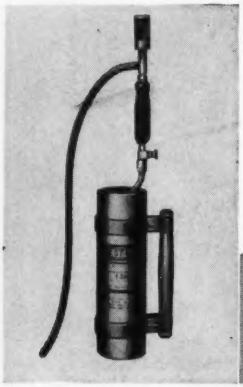
57 Tonawanda St. - - Buffalo, N. Y.

SUPPLIERS EVERYWHERE

PREST-O-LITE
Trade-Mark

HALIDE LEAK DETECTOR

Prest-O-Lite Halide Leak Detector with the B tank.



Prest-O-Lite Halide Leak Detector mounted on the MC tank.

The *Prest-O-Lite* Halide Leak Detector is a positive, sensitive device for locating leaks of non-combustible halide gases in refrigerating and air-conditioning units. These gases—such as F-12 (Freon), F-21, F-114 and Carrene—are relatively odorless, tasteless and colorless, properties which render necessary a quick, sure method of locating leaks.

Ask your jobber or any Linde office for a demonstration and descriptive folder.

FEATURES

1 Assures instant reaction to any concentration of refrigerant gases.

2 No preheating, pumping or priming required.

3 Economical to use. Need not be lighted until actual testing begins.

4 Two-color flame variation gives visible indication of amount of gases.

5 Quick clearing of flame after exposure to leaks.

6 Reaches easily into inaccessible places.

7 Readily portable—ideal for service work.

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
New York and Principal Cities
In Canada: Dominion Oxygen Company, Limited, Toronto

REFRIGERANT AND OIL DATA—*Continued from Page 40*

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Gaffers & Sattler 1936			Gaffers & Sattler Los Angeles, Calif.		
	50	SO	4 lbs. 8 ozs.	1 pt.	1/6
	60	SO	4 lbs. 8 ozs.	1 pt.	1/6
	65	SO	4 lbs. 8 ozs.	1 pt.	1/6
	70	SO	4 lbs. 8 ozs.	1 pt.	1/6
	80	SO	4 lbs. 8 ozs.	1 pt.	1/6
General Electric 1933			General Electric Co. Electric Refrigeration Dept., Nela Park, Cleveland, Ohio		
	HE-3	SO	2 lbs.	70 ozs.	1/6
	HE-4B	SO	2 lbs.	70 ozs.	1/6
	HE-5	SO	2¼ lbs.	70 ozs.	1/6
	HE-7	SO	2½ lbs.	70 ozs.	1/6
	E-4	SO	2½ lbs.	70 ozs.	1/6
	E-5	SO	2½ lbs.	70 ozs.	1/6
	S-44	SO	3½ lbs.	.....	1/10
	S-67	SO	5¾ lbs.	.....	1/8
	S-85	SO	5 lbs.	.....	1/6
	S-107	SO	5 lbs.	.....	1/6
	S-107	SO	6¼ lbs.	.....	1/6
	S-146	SO	5 lbs.	.....	1/6
	S-146	SO	6¼ lbs.	.....	1/6
	SS-182	SO	5 lbs.	.....	1/6
	SS-182	SO	6¼ lbs.	.....	1/6
	SS-182	SO	8 lbs.	.....	1/3
	P-55	SO	5¾ lbs.	.....	1/8
	P-62	SO	5¾ lbs.	.....	1/8
	P-67	SO	5¾ lbs.	.....	1/8
	P-85	SO	5 lbs.	.....	1/6
	P-110	SO	5 lbs.	.....	1/6
	P-110	SO	6¼ lbs.	.....	1/6
	P-134	SO	5 lbs.	.....	1/6
	P-134	SO	6¼ lbs.	.....	1/6
	P-170	SO	5 lbs.	.....	1/6
	P-170	SO	6¼ lbs.	.....	1/6
	P-170	SO	8 lbs.	.....	1/3
	PL-13	SO	5 lbs.	.....	1/6
	PS-13	SO	6¼ lbs.	.....	1/6
	P4-180	SO	5 lbs.	.....	1/6
	P4-180	SO	6¼ lbs.	.....	1/6
	P4-180	SO	8 lbs.	.....	1/3
	SD-40	SO	3¼ lbs.	.....	1/10
	HT-47	MF	2.15 lbs.	.....	1/8
	HX-70	MF	2.75 lbs.	.....	1/8
	HT-70	MF	2.75 lbs.	.....	1/8
			1934		
	F-3	SO	2 lbs.	70 ozs.	1/6
	F-4	SO	2 lbs.	70 ozs.	1/6
	F-5	SO	2½ lbs.	70 ozs.	1/6
	F-7	SO	2¾ lbs.	70 ozs.	1/6
	HE-3	SO	2 lbs.	70 ozs.	1/6
	HE-4	SO	2 lbs.	70 ozs.	1/6
	HE-5	SO	2¼ lbs.	70 ozs.	1/6
	HE-7	SO	2½ lbs.	70 ozs.	1/6
	PF-4	SO	2 lbs.	70 ozs.	1/6
	PF-5	SO	2½ lbs.	70 ozs.	1/6
	PF-7	SO	2¾ lbs.	70 ozs.	1/6

General Electric—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size	
GENERAL ELECTRIC 1934—*Continued from Preceding Page*						
	E-5	SO	2½ lbs.	70 ozs.	1/6	○
	HX-47	MF	2.15 lbs.	.....	1/8	
	HX-70	MF	2.75 lbs.	.....	1/8	
	X-5	MF	2.15 lbs.	.....	1/8	
	X-7	MF	2¾ lbs.	.....	1/8	
	T-7	MF	2¾ lbs.	.....	1/8	
	T-9	SO	3¼ lbs.	.....	1/6	
	T-14	MF	2¾ lbs. in ea.	.....	(2) 1/8	
	HT-47	MF	2.15 lbs.	.....	1/8	
	HT-70	MF	2¾ lbs.	.....	1/8	○
	S-107	SO	7¾ lbs.	.....	1/6	
	S-146	SO	7¾ lbs.	.....	1/6	
	S-182	SO	7¾ lbs.	.....	1/6	
	S-182	SO	5½ lbs.	1⅛ pts.	1/4	
	P-110	SO	7¾ lbs.	.....	1/6	
	P-134	SO	7¾ lbs.	.....	1/6	
	P-170 (Direct)	SO	7¾ lbs.	.....	1/6	
	P-170	SO	5½ lbs.	1⅛ pts.	1/4	
	P4-180 (Direct)	SO	7¾ lbs.	.....	1/6	○
	P4-180	SO	5½ lbs.	1⅛ pts.	1/4	
			1935			
	DK-1	SO	1 lb. 12 ozs.	.....	1/8	
	F-3	SO	2 lbs.	70 ozs.	1/6	
	F-4	SO	2 lbs.	70 ozs.	1/6	
	F-5	SO	2 lbs. 8 ozs.	70 ozs.	1/6	
	F-7	SO	2 lbs. 12 ozs.	70 ozs.	1/6	
	HT-47	SO	1 lb. 12 ozs.	.....	1/8	
	K-4	SO	1 lb. 12 ozs.	.....	1/8	
	K-5	SO	1 lb. 12 ozs.	.....	1/8	
	K-7	SO	2 lbs.	.....	1/8	
	KF-4	SO	1 lb. 10 ozs.	1⅛ pts.	1/6	
	KF-5	SO	1 lb. 10 ozs.	1⅛ pts.	1/6	
	KF-7	SO	2 lbs.	1⅛ pts.	1/6	
	KF-12	SO	3 lbs. 4 ozs.	1⅛ pts.	1/3	
	KF-15	SO	3 lbs. 4 ozs.	1⅛ pts.	1/3	
	KT-5	SO	1 lb. 12 ozs.	.....	1/8	
	KT-7	SO	2 lbs.	.....	1/8	
	LK-1	SO	1.4 lbs.	.....	1/8	
	LK-2	SO	1.4 lbs.	.....	1/8	
	P-134	SO	4 lbs.	1⅛ pts.	1/6	
	P-134	SO	5 lbs. 8 ozs.	1⅛ pts.	1/4	○
	P4-180	SO	4 lbs.	1⅛ pts.	1/6	
	P4-180	SO	5 lbs. 8 ozs.	1⅛ pts.	1/4	
	S-146	SO	4 lbs.	1⅛ pts.	1/6	
	S-146	SO	5 lbs. 8 ozs.	1⅛ pts.	1/4	
	T-5	SO	1 lb. 12 ozs.	.....	1/8	
	T-7	SO	2 lbs. 4 ozs.	.....	1/8	
	T-9	SO	2.7 lbs.	.....	1/6	
	X-3	SO	1 lb. 12 ozs.	.....	1/8	
	X-4	SO	1 lb. 12 ozs.	.....	1/8	○
	X-5	SO	1 lb. 12 ozs.	.....	1/8	
	X-6	SO	2 lbs. 4 ozs.	.....	1/8	
	X-7	SO	2 lbs. 4 ozs.	.....	1/8	
			1936			
	M-4	SO	1 lb. 12 ozs.	4 pts.	1/8	
	M-5	SO	1 lb. 12 ozs.	4 pts.	1/8	
	T-5	SO	1 lb. 12 ozs.	4 pts.	1/8	○
	M-6	SO	2 lbs. 4 ozs.	4 pts.	1/8	
	SM-66	SO	1 lb. 12 ozs.	4 pts.	1/8	
	M-7	SO	2 lbs. 4 ozs.	4 pts.	1/8	
	T-7	SO	2 lbs. 4 ozs.	4 pts.	1/8	
	TM-9	SO	2 lbs. 11 ozs.	4 pts.	1/6	

General Electric—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
GENERAL ELECTRIC 1936—*Continued from Preceding Page*					
	V-4	SO	1 lb. 12 ozs.	4 pts.	1/8
	V-5	SO	1 lb. 12 ozs.	4 pts.	1/8
	V-7	SO	2 lbs.	4 pts.	1/8
	LK-1	SO	1.4 lbs.	4 pts.	1/8
	LK-2	SO	1.4 lbs.	4 pts.	1/8
	KF-3	SO	2 lbs.	1½ pts.	1/6
	KF-12	SO	3 lbs. 4 ozs.	1½ pts.	1/3
	KF-15	SO	3 lbs. 4 ozs.	1½ pts.	1/3
	Some of the above models were of the 1935 line, carried along and also turned out in 1936. LK models formed Hotpoint line as well.				
Gibson 1933	**Gibson Electric Refrigerator Corp. Greenville, Mich.**				
	L-535	SO	20 ozs.	16 ozs.	1/5
	L-710	SO	33 ozs.	16 ozs.	1/5
	LH-54	SO	29 ozs.	16 ozs.	1/5
	PH-54	SO	29 ozs.	16 ozs.	1/5
	LH-63	SO	33 ozs.	16 ozs.	1/5
	PH-63	SO	33 ozs.	16 ozs.	1/5
	LH-77	SO	37 ozs.	16 ozs.	1/5
	PH-77	SO	37 ozs.	16 ozs.	1/5
	LH-82	SO	37 ozs.	16 ozs.	1/5
	PH-82	SO	37 ozs.	16 ozs.	1/5
	LH-98	SO	41 ozs.	16 ozs.	1/5
	PH-98	SO	41 ozs.	16 ozs.	1/5
	LH-49	SO	29 ozs.	16 ozs.	1/5
	LH-50	SO	29 ozs.	16 ozs.	1/5
	LG-53	SO	29 ozs.	16 ozs.	1/5
	LG-72	SO	33 ozs.	16 ozs.	1/5
	LH-148	SO	41 ozs.	16 ozs.	(2) 1/5
	PH-148	SO	41 ozs.	16 ozs.	(2) 1/5
	1934				
	LR-494	SO	35 ozs.	12 ozs.	1/5
	LR-504	SO	35 ozs.	12 ozs.	1/5
	LR-574	SO	35 ozs.	12 ozs.	1/5
	PR-574	SO	35 ozs.	12 ozs.	1/5
	SR-534	SO	35 ozs.	12 ozs.	1/5
	SR-724	SO	39 ozs.	12 ozs.	1/5
	LR-634	SO	39 ozs.	12 ozs.	1/5
	PR-634	SO	39 ozs.	12 ozs.	1/5
	LR-774	SO	43 ozs.	12 ozs.	1/5
	PR-774	SO	43 ozs.	12 ozs.	1/5
	L2-864	SO	43 ozs.	12 ozs.	1/5
	P2-864	SO	43 ozs.	12 ozs.	1/5
	1935				
	B-4	SO	28 ozs.	16 ozs.	1/8
	B-475	SO	28 ozs.	16 ozs.	1/8
	BF-4	SO	56 ozs.	16 ozs.	1/8
	BFT-4	SO	56 ozs.	16 ozs.	1/8
	BT-4	SO	56 ozs.	16 ozs.	1/8
	BX-4	SO	28 ozs.	16 ozs.	1/8
	L-575	SO	56 ozs.	16 ozs.	1/5
	L-705	SO	56 ozs.	16 ozs.	1/5
	L-835	SO	56 ozs.	16 ozs.	1/5
	LX-575	SO	28 ozs.	16 ozs.	1/5
	MG-35	SO	28 ozs.	16 ozs.	1/5
	MG-415	SO	28 ozs.	16 ozs.	1/5
	P-575	SO	56 ozs.	16 ozs.	1/5
	P-705	SO	56 ozs.	16 ozs.	1/5
	P-835	SO	56 ozs.	16 ozs.	1/5

Gibson—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
GIBSON—*Continued from Preceding Page*					
1936					
	S-46	SO	41 ozs.	16 ozs.	1/5
	S-56	SO	56 ozs.	16 ozs.	1/5
	S-86	SO	56 ozs.	16 ozs.	1/5
	CB-696	SO	56 ozs.	16 ozs.	1/5
	CB-796	SO	56 ozs.	16 ozs.	1/5
	SD-646	SO	56 ozs.	16 ozs.	1/5
	PCB-696	SO	56 ozs.	16 ozs.	1/5
	PCB-796	SO	56 ozs.	16 ozs.	1/5
Gilfillan 1933	Gilfillan Bros., Inc. 1815 Venice Blvd., Los Angeles, Calif.				
	500	SO	1¾ lbs.	12 ozs.	1/6
	600	SO	1¾ lbs.	12 ozs.	1/6
	700	SO	1¾ lbs.	12 ozs.	1/6
1934					
	500	SO	2 lbs.	16 ozs.	1/6
	600	SO	2 lbs.	16 ozs.	1/6
	700	SO	2 lbs.	16 ozs.	1/6
	800	SO	2 lbs.	16 ozs.	1/6
	5-S	SO	2 lbs.	16 ozs.	1/6
	6-S	SO	2 lbs.	16 ozs.	1/6
	7-S	SO	2 lbs.	16 ozs.	1/6
1935					
	50	SO	2 lbs.	1 lb.	1/6
	70	SO	2 lbs.	1 lb.	1/6
	5-D	SO	2 lbs.	1 lb.	1/6
	6-D	SO	2 lbs.	1 lb.	1/6
	7-D	SO	2 lbs.	1 lb.	1/6
1936					
	D-67	SO	3 lbs. 8 ozs.	16 ozs.	1/5
	D-610	SO	3 lbs. 8 ozs.	16 ozs.	1/5
	I-66	SO	3 lbs. 8 ozs.	16 ozs.	1/5
	S-65	SO	3 lbs. 8 ozs.	16 ozs.	1/6
	S-66	SO	3 lbs. 8 ozs.	16 ozs.	1/5
Graybar or Ilg-Kold 1933	Ilg Electric Ventilating Co. 2850 N. Pulaski Rd. Chicago, Ill.				
	The following models were produced in 1933-1934, but organization was not very active in household units.				
	45-L	Iso	10 ozs.	1¼ pts.	1/6
	55-L	Iso	10 ozs.	1¼ pts.	1/6
	65-L	Iso	10 ozs.	1¼ pts.	1/6
	85-L	Iso	10 ozs.	1¼ pts.	1/6
	65-P	Iso	10 ozs.	1¼ pts.	1/6
	85-P	Iso	10 ozs.	1¼ pts.	1/6
1934					
	45-L	Iso	10 ozs.	1¼ pts.	1/6
	55-L	Iso	10 ozs.	1¼ pts.	1/6
	65-L	Iso	10 ozs.	1¼ pts.	1/6
	85-L	Iso	10 ozs.	1¼ pts.	1/6
	65-P	Iso	10 ozs.	1¼ pts.	1/6
	85-P	Iso	10 ozs.	1¼ pts.	1/6

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Grinnell 1933	**Grinnell Washing Machine Corp. Grinnell, Iowa**				
	In 1933 Grinnell discontinued manufacture of household refrigerator units.				
	46	SO	1½ lbs.	½ pt.	1/6
	58	SO	1½ lbs.	½ pt.	1/6
	79	SO	1¾ lbs.	½ pt.	1/6
	4-E	SO	1½ lbs.	½ pt.	1/6
	5-E	SO	1½ lbs.	½ pt.	1/6
	6-E	SO	1¾ lbs.	½ pt.	1/6
	7-E	SO	1¾ lbs.	½ pt.	1/6
	L	SO	1½ lbs.	½ pt.	1/6
	F	SO	1½ lbs.	½ pt.	1/6
	G	SO	1¾ lbs.	½ pt.	1/6
	S	SO	1¾ lbs.	½ pt.	1/6
	7-T	SO	2 lbs.	½ pt.	1/6
	Models L, F, G, S and 7-T were brought out in 1932 and some were sold in 1933 as well.				
Grunow 1933	**General Household Utilities Corp. 2638 N. Pulaski Rd., Chicago, Ill.**				
	50-G	Car	3.8 lbs.	24 ozs.	1/5
	60-G	Car	3.8 lbs.	24 ozs.	1/5
	70-G	Car	3.8 lbs.	24 ozs.	1/5
	50	Car	3.5 lbs.	24 ozs.	1/5
	60	Car	3.8 lbs.	24 ozs.	1/5
	70	Car	3.8 lbs.	24 ozs.	1/5
	1934				
	46	Car	3.8 lbs.	50 ozs.	1/5
	65-SD	Car	3.8 lbs.	50 ozs.	1/5
	80-SD	Car	3.8 lbs.	50 ozs.	1/5
	54-D	Car	3.8 lbs.	50 ozs.	1/5
	65-D	Car	3.8 lbs.	50 ozs.	1/5
	80-D	Car	3.8 lbs.	50 ozs.	1/5
	50-D	Car	3.8 lbs.	50 ozs.	1/5
	1935				
	50-S	Car	37 ozs.	36 ozs.	1/6
	51-D	Car	40 ozs.	36 ozs.	1/6
	56-SD	Car	40 ozs.	36 ozs.	1/6
	60-S	Car	40 ozs.	36 ozs.	1/6
	61-D	Car	40 ozs.	36 ozs.	1/6
	67-D	Car	44 ozs.	36 ozs.	1/6
	67-SD	Car	44 ozs.	36 ozs.	1/5
	82-DSD	Car	50 ozs.	36 ozs.	1/5
	82-HSD	Car	50 ozs.	36 ozs.	1/5
	82-SD	Car	47 ozs.	36 ozs.	1/5
	1936				
	50-M	Car	3.5 lbs.	36 ozs.	1/6
	51-M	Car	3.8 lbs.	36 ozs.	1/6
	58-M	Car	3.8 lbs.	36 ozs.	1/6
	61-M	Car	3.8 lbs.	36 ozs.	1/6
	67-M	Car	3.8 lbs.	36 ozs.	1/6
	70-R	Car	4.1 lbs.	36 ozs.	1/5
	82-R	Car	4.1 lbs.	36 ozs.	1/5

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Gurney 1933	**Gurney Refrigerator Corp. 66 S. Brooke St., Fond du Lac, Wis.**				
	(Models were equipped with Sunbeam units)				
	4	SO	1¾ lbs.	1 pt.	1/6
	5	SO	1¾ lbs.	1 pt.	1/6
	6	SO	1¾ lbs.	1 pt.	1/6
	8	SO	1¾ lbs.	1 pt.	1/5
	10	SO	1¾ lbs.	1 pt.	1/4
Hostess 1933	**Hostess Corp., Ltd. 101 Hanson St., Toronto, Ont., Canada**				
	H-45	SO	3¼ lbs.	½ gal.	1/6
	H-55	SO	3¼ lbs.	½ gal.	1/6
	H-77	SO	3½ lbs.	½ gal.	1/6
	(Oil given in Imperial measure)				
	1934				
	DX-54	SO	3¼ lbs.	½ gal.	1/6
	DX-74	SO	3¾ lbs.	½ gal.	1/6
	(Oil given in Imperial measure)				
	1935				
	405	SO	1½ lbs.	½ gal.	1/6
	505	SO	3¼ lbs.	½ gal.	1/6
	605	SO	3¼ lbs.	½ gal.	1/6
	705	SO	3½ lbs.	½ gal.	1/6
	(Oil given in Imperial measure)				
	1936				
	406	SO	1½ lbs.	½ gal.	1/6
	506	SO	3¼ lbs.	½ gal.	1/6
	606	SO	3¼ lbs.	½ gal.	1/6
	706	SO	3¾ lbs.	½ gal.	1/6
	716	SO	3¾ lbs.	½ gal.	1/6
	(Oil given in Imperial measure)				
Hotpoint 1933	**Hotpoint Refrigeration Division General Electric Co. Nela Park, Cleveland, Ohio**				
	HP-4A	SO	2½ lbs.	70 ozs.	1/6
	HP-4B	SO	2 lbs.	70 ozs.	1/6
	HP-5A	SO	2¼ lbs.	70 ozs.	1/6
	HP-7A	SO	2½ lbs.	70 ozs.	1/6
	E-5	SO	2½ lbs.	70 ozs.	1/6
	1934				
	PF-4	SO	2 lbs.	70 ozs.	1/6
	PF-5	SO	2½ lbs.	70 ozs.	1/6
	PF-7	SO	2¾ lbs.	70 ozs.	1/6
	1935				
	A-4	SO	1 lb. 10 ozs.	1⅛ pts.	1/6
	A-5	SO	1 lb. 10 ozs.	1⅛ pts.	1/6
	A-7	SO	2 lbs.	1⅛ pts.	1/6
	AP-5	SO	1 lb. 10 ozs.	1⅛ pts.	1/6

Hotpoint—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
HOTPOINT 1935—*Continued from Preceding Page*					
	AP-7	SO	2 lbs.	1⅛ pts.	1/6
	AP-12	SO	3 lbs. 4 ozs.	1⅛ pts.	1/3
	AP-15	SO	3 lbs. 4 ozs.	1⅛ pts.	1/3
			1936		
	A-4	SO	1 lb. 10 ozs.	1⅛ pts.	1/6
	A-5	SO	1 lb. 10 ozs.	1⅛ pts.	1/6
	A-7	SO	2 lbs.	1⅛ pts.	1/6
	AP-5	SO	1 lb. 10 ozs.	1⅛ pts.	1/6
	AP-7	SO	2 lbs.	1⅛ pts.	1/6
	AP-12	SO	3 lbs. 4 ozs.	1⅛ pts.	1/3
	AP-15	SO	3 lbs. 4 ozs.	1⅛ pts.	1/3
	AV-43	SO	1 lb. 10 ozs.	1⅛ pts.	1/6
	AV-52	SO	1 lb. 10 ozs.	1⅛ pts.	1/6
	AV-70	SO	2 lbs.	1⅛ pts.	1/6
	LK-1	SO	1.4 lbs.	4 pts.	1/8
	LK-2	SO	1.4 lbs.	4 pts.	1/8
Icemaster 1935		**Icemaster Company Haverhill, Mass.**			
	P-5	MC	1 lb. 8 ozs.	1.5 pts.	1/6
	P-6	MC	1 lb. 8 ozs.	1.5 pts.	1/6
	P-7	MC	1 lb. 8 ozs.	1.5 pts.	1/6
Ice-O-Matic 1933		**Williams Oil-O-Matic Heating Corp. Bloomington, Ill.**			
	D-72	MC	.....	.....	1/4
	L-40	MC	2 lbs.	1 pt.	1/6
	L-53	MC	2 lbs.	1¼ pts.	1/5
	L-64	MC	2 lbs.	1¼ pts.	1/5
	L-53T	MC	1½ lbs.	3 pts.	1/6
	L-64T	MC	1½ lbs.	3 pts.	1/6
	P-53	MC	2 lbs.	1¼ pts.	1/5
	P-64	MC	2 lbs.	1¼ pts.	1/5
	Y-4	MC	2 lbs.	1 pt.	1/6
	Y-5	MC	2 lbs.	1 pt.	1/6
	Y-6	MC	2 lbs.	1 pt.	1/6
			1934		
	D-44	MC	2 lbs.	1¼ pts.	1/5
	D-55	MC	2 lbs.	1¼ pts.	1/5
	P-66	MC	2 lbs.	1¼ pts.	1/5
	D-66	MC	2 lbs.	1¼ pts.	1/5
	P-80	MC	2 lbs.	1¼ pts.	1/5
	D-80	MC	2 lbs.	1¼ pts.	1/5
			1935		
	D-3566-2	MC	2 lbs. 8 ozs.	1.5 pts.	1/6
	D-358-2	MC	2 lbs. 8 ozs.	1.5 pts.	1/6
	P-3566-2	MC	2 lbs. 8 ozs.	1.5 pts.	1/6
	P-358-2	MC	2 lbs. 8 ozs.	1.5 pts.	1/8
	S-354-1	MC	2 lbs. 8 ozs.	1.5 pts.	1/8
	S-355-1	MC	2 lbs. 8 ozs.	1.5 pts.	1/6
	S-355-2	MC	2 lbs. 8 ozs.	1.5 pts.	1/6
	S-356-2	MC	2 lbs. 8 ozs.	1.5 pts.	...

Ice-O-Matic—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
ICE-O-MATIC—*Continued from Preceding Page*					
			1936		
	AP-12	MC	7 lbs. 6 ozs.	2½ pts.	1/4
	AP-15	MC	8 lbs. 14 ozs.	3 pts.	1/3
	AP-19	MC	10 lbs. 8 ozs.	3 pts.	1/3
	D-3641	MC	4 lbs. 7 ozs.	2½ pts.	1/8
	D-3651	MC	4 lbs. 15 ozs.	2½ pts.	1/8
	D-3662	MC	5 lbs. 3 ozs.	2½ pts.	1/6
	D-3682	MC	5 lbs. 6 ozs.	2½ pts.	1/6
	P-3662	MC	5 lbs. 3 ozs.	2½ pts.	1/6
	P-3682	MC	5 lbs. 6 ozs.	2½ pts.	1/6
Jewett 1933	Jewett Refrigerator Corp. 2 Letchworth St., Buffalo, N. Y.				
	SO	MC	1 lb.	1 pt.	1/6
	100	MC	1 lb.	1 pt.	1/6
	JK-55	MC	1 lb.	1 pt.	1/6
	JK-65	MC	1 lb.	1 pt.	1/6
			1934		
	JK-65	MC	1 lb.	1 pt.	1/6
	D-70	SO	2½ lbs.	1 pt.	1/6
	80	MC	1 lb.	1 pt.	1/4
	100	MC	1 lb.	1 pt.	1/4
			1935		
	52	SO	1 lb. 8 ozs.	1 pt.	1/6
	64	SO	1 lb. 8 ozs.	1 pt.	1/6
Jomoco 1933	Jomoco, Inc. Waukegan, Ill.				
	R-10	SO	25 ozs.	14 ozs.	1/5
			1934		
	L-4	SO	1½ lbs.	14 ozs.	1/5
	L-5	SO	1½ lbs.	14 ozs.	1/5
	P-5	SO	1½ lbs.	14 ozs.	1/5
	L-6	SO	1½ lbs.	14 ozs.	1/5
	P-6	SO	1½ lbs.	14 ozs.	1/5
	P-8	SO	1½ lbs.	14 ozs.	1/5

INFORMATION
ON ADDITIONAL MACHINES
CONTINUED IN THE JULY ISSUE

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

70 Per Cent of Exhibit Space for 4th Convention Reserved

WITH active plans under way for the most important convention of the Refrigeration Service Engineers' Society at the Stevens Hotel in Chicago on November 3, 4 and 5, reservations for the manufacturers' exhibits have now totalled 68 per cent of the present space available.

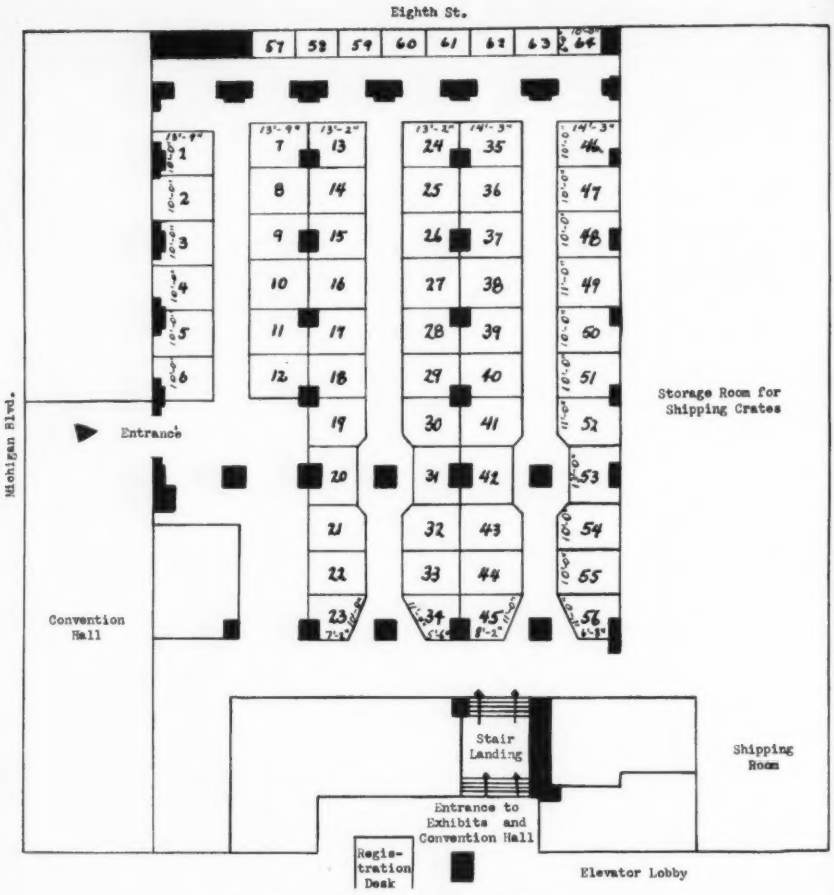
In the large exhibition hall of the Stevens Hotel, which provides unequalled facilities, will be displayed probably the outstanding exhibit of refrigeration accessories and parts of the year. The manufacturers' exhibit is an important educational feature of the convention, and here under one roof will be displayed a diversified line of products of leading manufacturers that will be well worth the time of every service engineer to inspect.

The list of exhibitors, together with their space reservations, follows:

Booth No.

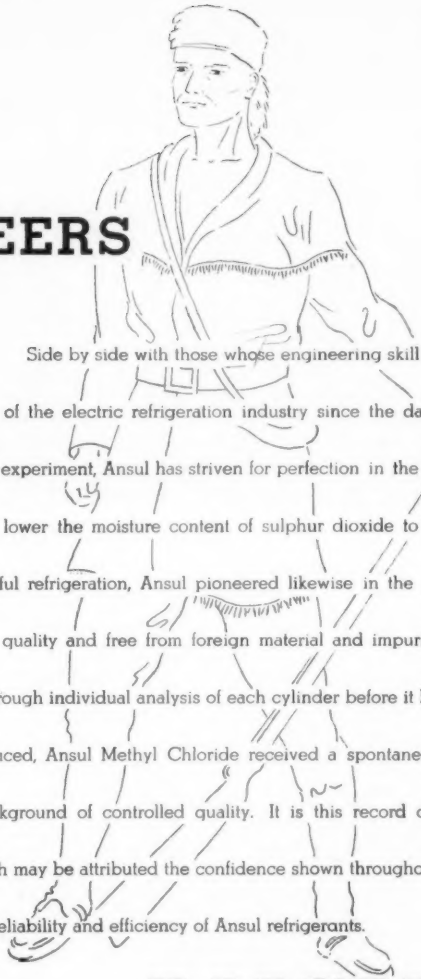
2 Alco Valve Co., St. Louis, Mo.
4 and 5 Penn Electric Switch Co., Des Moines, Ia.
6 Rotary Seal Co., Chicago, Ill.
8 R. & H. Chemicals Dept., Wilmington, Dela.
10 Mueller Brass Co., Port Huron, Mich.
11 and 12 Peerless of America, Inc., Chicago, Ill.
14 Marlo Coil Co., St. Louis, Mo.
15 Airo Supply Co., Chicago, Ill.
16 James P. Marsh Corp., Chicago, Ill.
17 South Bend Lathe Works, South Bend, Ind.
18 Henry Valve Co., Chicago, Ill.
19 Automatic Heating & Cooling Supply Co., Chicago, Ill.

21 L. H. Gilmer Co., Philadelphia, Pa.
22 Herman Goldberg Co., Chicago, Ill.
23 Ranco, Inc., Columbus, Ohio.
24 Kellogg Compressor & Mfg. Co., Rochester, N. Y.
25 Snap-On Tools, Inc., Kenosha, Wis.
26 Zenith Carburetor Co., Detroit, Mich.
27 and 28 Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
29 American Injector Co., Detroit, Mich.
30 Fedders Manufacturing Co., Inc., Buffalo, N. Y.
31 Kold-Hold Manufacturing Co., Lansing, Mich.
32 Kerotest Manufacturing Co., Pittsburgh, Pa.



PLAN OF EXHIBIT SPACE FOR R.S.E.S. CONVENTION.

33 Business News Publishing Co., Detroit, Mich.
34 Detroit Lubricator Co., Detroit, Mich.
35 General Electric Co., Cleveland, Ohio.
36 Victor Manufacturing & Gasket Co., Chicago, Ill.
37 Bonney Forge & Tool Wks., Allentown, Pa.
38 Tecumseh Products Co., Tecumseh, Mich.
39 Refrigeration Maintenance Corp., Chicago, Ill.
40 The Starr Co., Richmond, Ind.
42 Borg-Warner Service Parts Co., Chicago, Ill.
43 Automatic Products Co., Milwaukee, Wisc.
44 Harry Alter Co., Chicago, Ill.
45 Detroit Lubricator Co., Detroit, Mich.
46 Virginia Smelting Co., West Norfolk, Va.
47 Kelvinator Corp., Detroit, Mich.
49 Perfection Refrigeration Parts Co., Harvey, Ill.
50 and 51 Imperial Brass Manufacturing Co., Chicago, Ill.
52 Wolverine Tube Co., Detroit, Mich.
54 Mills Novelty Co., Chicago, Ill.
55 Cutler - Hammer, Inc., Milwaukee, Wis.
56 Ansul Chemical Co., Marinette, Wis.
60 H. Channon Co., Chicago, Ill.



PIONEERS

Side by side with those whose engineering skill has contributed to the development of the electric refrigeration industry since the days when it was hardly more than an experiment, Ansul has striven for perfection in the quality of their refrigerants. First to lower the moisture content of sulphur dioxide to the percentage required for successful refrigeration, Ansul pioneered likewise in the production of a product uniform in quality and free from foreign material and impurities; was first to insure satisfaction through individual analysis of each cylinder before it leaves the plant. When it was introduced, Ansul Methyl Chloride received a spontaneous acceptance because of this background of controlled quality. It is this record of research and achievement to which may be attributed the confidence shown throughout the refrigeration industry in the reliability and efficiency of Ansul refrigerants.

ANSUL

SULPHUR DIOXIDE

METHYL CHLORIDE

ANSUL CHEMICAL COMPANY - MARINETTE, WISCONSIN

GROUP AT CHICAGO CHAPTER MEETING SPONSORED BY JOBBERS.

Jobbers Are Hosts to Chicago Chapter

AN eventful evening—May 25—when business and other serious problems of life were dispensed with and Chicago jobbers played host to Chicago Chapter of the Refrigeration Service Engineers' Society. The evening was one of good fellowship, and provided an excellent opportunity for all members to become acquainted with those men who are providing up-to-the-minute service for the refrigeration industry, and occupy such an important position between manufacturer and user.

The South Ballroom of the Stevens Hotel was crowded to accept the hospitality of the evening. The following Chicago refrigeration suppliers acted as hosts:

Airo Supply Company
Harry Alter Company
Automatic Heating & Cooling Supply Co.
B-Line Refrigerator Parts Co.
H. W. Blythe Company
Borg-Warner Service Parts Co.
H. Channon Company
Chase Refrigeration Supply Co.
W. W. Grainger, Inc.
Standard Refrigeration Parts Co.

The evening's festivities were opened by Pres. Ivar Skipple, of Chicago Chapter, who voiced the appreciation of the members for the splendid cooperation of the jobbers and their provision for this meeting. He then introduced Mr. George Monjian, of the Chicago Refrigeration Service Co., who is Chairman of the Entertainment Committee of Chicago Chapter. Mr. Monjian and his committee worked hard for the success of this event and their careful planning resulted in a most enjoyable evening.

The business of the evening was the initiation of five candidates, under the capable supervision of the Entertainment Committee. This high-light of the evening was thoroughly enjoyed by all, and the initiation team, comprising the following members—Messrs. George Monjian, Ralph Vanston, Joseph Holub, Jr., Harry DeGan, J. M. Lawyer, Joseph Corso, Fred Roth and Harry Logemann—duly performed their ceremony in a manner that amused all. The candidates realized their shortcomings and weaknesses when it comes to refrigeration work. This team is to be highly complimented upon the perfection of their work, and it is expected that they will be able to perform for other chapters convenient to Chicago. For the benefit of the national

THE HOSTS OF THE EVENING—CHICAGO JOBBERS.

Left to right: E. C. Chase, Chase Refrigeration Supply Co.; Ray Johnson, Borg-Warner Service Parts Co.; Wm. Hauber, Automatic Heating & Cooling Supply Co.; E. W. Scotten, Airo Supply Co.; Irving Alter, Harry Alter Co.; H. W. Blythe, H. W. Blythe Co.; P. M. Rozelle, W. W. Grainger Co.; B. B. Dawes, H. Channon Co.; G. W. Sisson, B-Line Refrigerator Parts Co.; Harry Goldberg, Standard Refrigeration Parts Co.

membership, they will perform their initiation at the National Convention.

Mr. Herbert Binner, secretary of the Chicago Refrigeration Suppliers, was introduced and spoke upon the objects for which the local jobbers' organization was formed. Mr. Monjian then introduced the representatives of the various jobbers, who had

CHICAGO CHAPTER INITIATION TEAM.

Rear: Left to right. Geo. Monjian, Joseph Corso, Ralph Vanston, Harry Logemann.
Front: Fred Roth, J. M. Lawyer, Harry DeGan, Joseph Holub, Jr.

sponsored this meeting, consisting of the following:

E. W. Scotten, Airo Supply Co.
Irving Alter, Harry Alter Co.
William Hauber, Automatic Heating & Cooling Supply Co.
G. W. Sisson, B-Line Refrigerator Parts Co.
H. W. Blythe, H. W. Blythe Co.
Ray Johnson, Borg-Warner Service Parts Co.
B. B. Dawes, H. Channon Co.
E. C. Chase, Chase Refrigeration Supply Co.
P. M. Rozelle, W. W. Grainger, Inc.
Harry Goldberg, Standard Refrigeration Parts Co.

After the festivities of the evening, a delightful buffet lunch and refreshments were served, with the compliments of the jobbers' organization, and the party lasted until the wee small hours.

This meeting served to further the mutual interests of both groups.

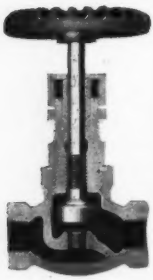
COLUMBUS CHAPTER RECEIVES CHARTER

ON April 27, Columbus Chapter assembled to receive its charter. Preceding the meeting, National President Paul Jacobsen instituted the question box, and a round table discussion was participated in by the members present, which proved to be of much interest.

President Jacobsen then proceeded with the presentation of the charter and obligation of the members, and outlined the activities that the chapter should adopt.

Election of permanent officers resulted in the following:

President—L. E. Mack
1st Vice-President—D. G. Little
2nd Vice-President—N. K. Mason
Secretary—R. E. Yeager
Treasurer—P. Shapiro
Sergeant-at-Arms—L. B. Laing
Board of Directors—C. W. Belt, R. C. Kaiser, Jr., and J. D. Merkle
Chairman of Educational Committee—R. R. Dunlop



Krupp Valves & Water Regulators

for Ammonia Service

Our semi-steel valves have new features: the improved swivel seat, *new bonnet construction* and pressure cap lock. All valves contain the highest grade metallic packing.
Descriptive literature mailed upon request.

for Methyl-Freon-Sulphur

Water valve body is made of cast bronze and has renewable rubber composition seat. Noiseless in operation. The frame is so designed that adjustments can be made easily. Operating range from 50 to 150 lbs.

CYRUS SHANK CO.
625-631 W. Jackson Blvd., CHICAGO, ILL.
Manufacturers of Krupp Valves for Mechanical Refrigeration

ASSISTED MOTION

INSURES RAPID HEAT TRANSFER

Don't depend on the refrigerant in your coil to move along entirely on its own power. Assist the motion with "THERMO FIN" in Tube.

This patented feature found only in products of MANUFACTURERS FIN COIL COMPANY sets up a washing motion utilizing the entire wall of the tubes greatly adding to the effective surface.

Manufacturers Fin Coil Company
2505 So. Pulaski Road. Rockwell 7544. CHICAGO, ILL.

WRITE TODAY FOR OUR 1937 CATALOG

IMPERIAL NIGHT AT TWIN CITY CHAPTER, MINNEAPOLIS.

IMPERIAL NIGHT AT TWIN CITIES CHAPTER

ON May 20th the Twin Cities Chapter of the R.S.E.S. had a most enjoyable evening, at a special meeting held at the Hotel Nicollet in Minneapolis. This evening was "Imperial Night" sponsored by the Imperial Brass Manufacturing Company of Chicago. Mr. R. M. McIntosh, chief engineer of the company, gave a most interesting talk.

After this educational meeting, a luncheon and refreshments were served and enjoyed by all.

Buy From a National SUPPLY JOBBER

IN no industry is the need for a supply jobber more pronounced than in the refrigeration industry. The supply jobber makes it possible for the hundreds of manufacturers of parts and equipment to get complete distribution to the thousands of refrigeration service companies and dealers quickly and at low cost. The supply jobber has performed his function of buying from hundreds of manufacturers and selling to thousands of service and dealer organizations quietly and efficiently, keeping pace with the rapidly changing market conditions.

Only five short years ago service men had to contact several manufacturers or distributors for parts or supplies to permit them to install or service equipment. Loss of time, delays, manufacturers' policies and high prices made it almost impossible to do business at a profit. Efficient jobbers' organizations have changed these conditions so that today it is possible for any legitimate service organization to purchase all their parts and supplies from a responsible jobber and secure immediate, out of stock, delivery at reasonable, low prices.

The old and responsible refrigeration supply jobbers have formed the National Refrigeration Supply Jobbers Association in a spirit of co-operation to improve existing conditions. They deserve the support of the entire refrigeration industry.

NATIONAL REFRIGERATION SUPPLY JOBBERS ASSOCIATION

Headquarters:

2707 David Stott Bldg. Detroit, Michigan

ST. LOUIS CHAPTER

Meeting of April 22, 1937

By E. A. PLESSKOTT, *Secretary*
2145 67th St., St. Louis, Mo.

THIS meeting was held in the auditorium of the David Ranken, Jr., School of Mechanical Trades, and was called to order by President Gygax, followed by the reading of the minutes of our April 8th meeting.

President Gygax thanked Mr. G. J. Wangerin on behalf of the chapter for the privilege of meeting with his class and expressed the thought that we both should gain much by this association.

From this point on, Mr. Wangerin, instructor-in-chief of the refrigeration classes, and a member of St. Louis Chapter, took charge of the meeting. He introduced Mr. Josehans, science instructor, who was to have demonstrated with suitable apparatus the mechanical equivalent of heat, but, unfortunately, the apparatus would not function properly, and what would no doubt have been the highlight of the evening to most of those present was a total loss. It was promised that a meeting in the near future would see this demonstration an accomplished fact.

Mr. Wangerin next put two of his students to work demonstrating various leak detectors on a variety of gases, and another student on the explanation of superheat, with a cut-away valve and an actual hook-up with thermometers in the lines so that the difference could be measured and seen by everyone. This was further elaborated upon by Mr. Wangerin himself.

The oil trapping and oil return problems were next in order, and were explained and demonstrated with the aid of a visual demonstrator by still another student.

After adjournment of the meeting, the men were shown around the shops, and a further explanation of the teaching methods was given them.

Meeting of May 13, 1937

The meeting of May 18th was held at the German House and was called to order by President E. Gygax at 8:30 P.M. The reading of the minutes of the previous meeting was deferred until after the educational feature of the evening in order to give the speakers as much time as they wished.

President Gygax introduced Mr. J. J. Grant, small motors engineer of the Wagner Electric Corporation who together with the assistance of two men and a stereopticon gave a most interesting illustrated talk on fractional horsepower motors as made by his company.

At the conclusion of his talk, Mr. B. J.

ELECTRIMATIC WATER REGULATORS

TYPE ECONO
FOR
FREON-METHYL-SULPHUR

DESIGNED FOR
SMALL COMMERCIAL
REFRIGERATION OR
AIR CONDITIONING
INSTALLATIONS
FURNISHED IN ⅜" SIZE,
WITH BRONZE BODY,
AND REPLACEABLE
VALVE SEAT AND
SEAT DISC

WRITE FOR CATALOG
THE ELECTRIMATIC CORP.
2100 Indiana Ave., CHICAGO, ILL.

Service Contractors!

Do you know your
LABOR and MATERIAL costs?

Use service forms
ENDORSED and
AUTHORIZED by:

REFRIGERATION SERVICE ENGINEERS SOCIETY
433 N. Waller Ave. Chicago
Write for Samples and Prices

McCormick, also of the Engineering Department of the Wagner Electric Corporation gave a very interesting blackboard talk on the various motor tests to be made in the field, told how to work out everyday problems that the service engineer should know, and then held an open forum on motor troubles and their remedies, and with questions and answers concluded this interesting educational feature. A vote of thanks was tendered the gentlemen of the Wagner Electric Corporation for a most interesting evening.

PITTSBURGH CHAPTER

Meeting of May 10, 1937

By F. V. GOLITZ, *Secretary*
1109 Pemberton St., Pittsburgh, Pa.

THIS meeting was held at the Mayfair Hotel with about one hundred members and visitors present. The meeting was sponsored by Williams and Company, and was under the direction of Mr. H. S. McCloud.

Mr. McCloud introduced Mr. K. W. Way and Mr. A. B. Shellenberg, speakers for the Alco Valve Company, and Mr. Charles Gary of the Henry Valve Company.

Mr. Shellenberg lectured on the automatic expansion valve, his lecture being illustrated with slides. Mr. Shellenberg covered the entire subject of installing and servicing the automatic expansion valve.

Mr. Gary followed, and described the Henry dehydrators and strainers.

The glass evaporator was then demonstrated by Mr. Way. This proved to be a very interesting demonstration as it showed the action of the expansion valve and behavior of the refrigerant in the coils of the evaporator.

On behalf of the members and visitors Mr. Kirch thanked Messrs. Way, Shellenberg and Gary for their interesting program.

Due to the lateness of the hour, the business meeting was postponed until the June meeting.

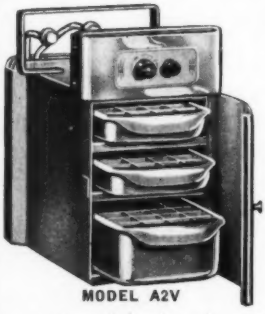
MISSISSIPPI VALLEY CHAPTER

Meeting of April 9, 1937

By E. L. BENGSTON, *Secretary*
116 E. First St., Davenport, Iowa

THIS meeting, held at the Davenport Hotel, was opened by Vice-President Leonard Nelson in the absence of President J. L. Fish.

Vice-President Nelson introduced the educational speakers of the evening: Mr. P. L. Tollerton of Ranco; Mr. M. M. Lord of the Texas Oil Company; and Mr. Austin Jones, factory representative for the Kero-


MODEL A2V

PEERLESS "HUMIDI-PACK"

Hot Weather Ahead—

Thousands of old electric refrigerators are going to "give up the ghost" in the next two months.

Thousands of frantic housewives are going to call on you to repair these refrigerators.

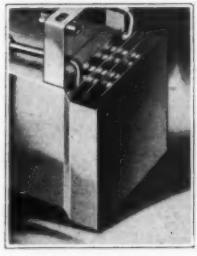
Thousands of old refrigerators can be made "new" again and thousands of housewives made happy if you will replace old evaporators with—

NEW 1937 PEERLESS "HUMIDI-PACKS"

★ ★ ★ ★ ★ ★ ★ ★ ★

The New — Fast Freezing — Fast Cooling Household Replacement Evaporator

Peerless "Humidi-Pack"—the power pack of refrigeration, gives faster, steadier, better refrigeration to household boxes. Maintains high box humidity—greater ice cube capacity.



PEERLESS of AMERICA, Inc.

ESTABLISHED IN 1912 AS THE PEERLESS ICE MACHINE CO.

Main Factory—General Offices

NEW YORK FACTORY 43-20 34th St. LONG ISLAND CITY

515 W. 35th St. CHICAGO

PACIFIC COAST FACTORY 3000 S. Main St. LOS ANGELES

test Manufacturing Company and the Chicago Flexible Metal Hose Company. All of these speakers gave very interesting talks and their messages were very much appreciated by the members.

Two new members were accepted and their applications approved. They are Mr. Russell Miller and A. D. Stivers, both of Galesburg, Illinois. The Membership Committee not only approved the applications of these two men but also approved the applications of the other members.

Roll call was then taken, followed by the Treasurer's report by Mr. Fred Tindall, Treasurer. The report was approved by all. Minutes of the previous meeting were then accepted as read by Secretary E. L. Bengston.

Motion was passed to hold meetings only once a month during the summer.

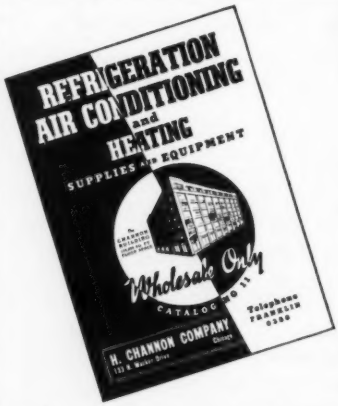
The business meeting was then adjourned and the members enjoyed the Stag which followed which had been planned by our Entertainment Committee consisting of Messrs. A. B. Munchrath, C. L. Hartman and E. F. Fredericks.

Meeting of May 14, 1937

Vice-President Leonard Nelson opened the meeting and introduced Dr. E. Vernon Hill, the speaker of the evening—of the Refrigeration & Air Conditioning Institute of Chicago. Dr. Hill spoke on air conditioning.

Dr. E. Vernon Hill is an authority on air conditioning and has been appointed to the newly created post of Director of Research and Education for the above-mentioned Institute, located at 2150 Lawrence Avenue, Chicago. The appointment, made upon the recommendation of a number of the Institute's Board of Governors, was announced by Ray D. Smith, President. The naming of Dr. Hill to this position constitutes the Board's recognition of his accomplishments in the air conditioning field. In 1899 he matriculated in chemistry at the University of Chicago, later attending Rush Medical College, from which he graduated in 1903 and began the practice of medicine.

Dr. Hill's test methods in air conditioning are generally used in this country and have been republished in England, Russia and Japan. He is the author of "Aerology for Amateurs and Others" and "The A.C.E. Handbook." For several years he was the editor of the Aerologist Magazine. Dr. Hill's talk was appreciated by all of the members of the Society, as well as the men from the Herman Nelson Corporation, manufacturers of air conditioning systems, and the men from Cedar Rapids.



CATALOG No. 11

Parts—Tools—Supplies
Equipment

INTRODUCES THE GREAT

CHANCO Highside

Made and Guaranteed by one of the oldest and largest manufacturers of refrigeration equipment in the world

CHANNON CO.
Now Authorized Distributors
GENUINE KELVINATOR PARTS

A complete line of KELVINATOR parts in stock

Get All Details—Write On Your Letterhead

H. CHANNON COMPANY
133 N. Wacker Drive **Tel. Franklin 0380**
Chicago, Illinois

"Suppliers to the Refrigeration and Air Conditioning Trades"

A letter received from the National Membership Committee was read. Motion was made and passed that the two members of this chapter getting the most members to join will receive a year's membership dues free and that all members getting four new members or more will also receive a year's membership dues free.

A representative from the Temprite Products Corporation will speak at the next meeting to be held Friday, June 11th.

CENTRAL NEW YORK CHAPTER

Meeting of April 12, 1937

By F. G. MACKIN, *Secretary*
615 Caleb Ave., Syracuse, N. Y.

THIS was an open meeting with about eighty service men present and President Carl Stewart asked for suggestions regarding service price increase, and several of those present expressed their opinions on the subject. Two dollars per hour was suggested and a rising vote taken proved that it was favored by the majority of those present. A motion was adopted that two dollars per hour be set as the standard rate in Syracuse.

President Stewart then explained—for the benefit of any non-members present—the objects and benefits of the R.S.E.S.

Mr. Dan D. Wile of the Detroit Lubricator Company gave a very interesting talk on expansion valves, after which refreshments were served.

A rising vote of thanks was given the Syracuse Supply Company for the use of their meeting room and also the refreshments.

Meeting of May 10, 1937

The meeting was called to order by President Carl Stewart at 8:30 P.M., followed by the Secretary's report which was accepted as read.

Several letters received by the chapter were read and acted upon.

It was decided that in case anything developed in regard to the code question, a special meeting would be called.

As there was no other business to be taken care of the meeting was then adjourned.

CHICAGO CHAPTER

Meeting of April 13, 1937

By WILLIS STAFFORD, *Secretary*
726 Hinman St., Aurora, Ill.

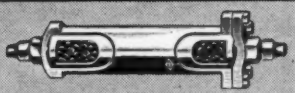
MR. FRED ROTH, chairman of the Membership Committee, reported on the progress of his committee's drive for new members. Ten more members have been signed up and are ready for the Board of Directors' approval. The committee is

GET RID OF MOISTURE with these new IMPERIAL DEHYDRATORS

MOISTURE in refrigerant is such a constant source of trouble that these new Imperial Dehydrators are receiving a rousing welcome from service men everywhere.

In the new No. 313-C Dehydrator and its mate, the No. 314-C, the drier is contained in a refill cartridge which is made of brass with screen and felt at each end. The bolted end allows for quick change and when this end is put on the inlet side, the dirt and scale can be removed when replacement is made. Cartridges of activated alumina, calcium chloride, or calcium oxide as specified . . . and then there is the Imperial flanged dehydrator furnished in various lengths with dispersion tube at the inlet end that assures even distribution of refrigerant . . . and another new development is the No. 31-C—one of the lowest priced dehydrators on the market. It is suitable for use on small systems and it is frequently left on as a permanent part of the system.

IMPERIAL BRASS MFG. CO.
1204 W. Harrison St., Chicago, Ill.



Nos. 313-C and 314-C cartridge refill dehydrator with demountable flange

WRITE FOR COMPLETE INFORMATION about these new dehydrators and other new Imperial items for service work.

No. 385-C flanged dehydrator with dispersion tube

No. 31-C small dehydrator for permanent installation

IMPERIAL Dehydrators

ORDER FROM YOUR JOBBER

VALVES • FITTINGS • TOOLS • CHARGING LINES • STRAINERS • FLOATS

sending out five hundred letters to prospective members this week. They expect a good response from this mailing.

Mr. George Monjian, chairman of the Entertainment Committee, reported that the recent party put on by his committee was a social and financial success. The Entertainment Committee expressed their appreciation to the members for the splendid support given them at the party.

At this point, the meeting was turned over to the Educational Committee. Mr. R. L. Hendrickson gave an interesting discussion on Evaporative Condensers. This is a new development in refrigeration and proved to be a very timely topic. The members asked many interesting questions after the talk.

Mr. Harry D. Busby, who has returned to Chicago, was introduced. He informed us he will be with us again and that he is glad to be back.

Meeting of April 27, 1937

A letter from Mr. C. O. McCauley, chairman of the National Membership Committee, was read. There will be several prizes given this year and the contest will be a very interesting one.

A letter was read from the National Secretary's office stating that the consent of the National Board of Directors has been obtained to put the list price catalog situation on a national basis. The following is the policy adopted by the National Board:

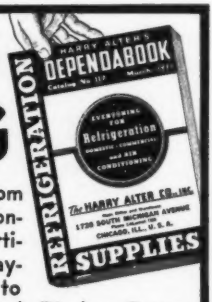
"To suggest to refrigeration parts jobbers, manufacturers and other distributing concerns of refrigeration equipment, supplies and accessories, to adopt the policy of publishing only list prices in their catalogs and printed literature, with a separate or detachable discount sheet.

"After due consideration of this question, it is the consensus of opinion that such method of cataloging will react favorably not only to the refrigeration service engineer, but also to the jobber in that it provides a sales manual for the service engineer which can be used in selling his service, equipment, supplies and accessories to the consuming public."

The Entertainment Committee reported that the date for our annual dinner dance has been set for June 19th, at the Stevens Hotel. Further developments will be forthcoming at the next meeting.

At this point the meeting was turned over to the initiation team for the initiation of six new members. The team's program was even better than the last time. They provided over an hour's interesting and entertaining program. The candidates learned what a valuable asset the R.S.E.S. is when one gets tangled up with the "law." If the team's ability keeps increasing we will soon

Get this NEW BARGAIN CATALOG



From Crispers to Highsides, from Accessories to Air Conditioning Equipment, from Artificial Food for displaying refrigerators to Refrigerated Display Cases for displaying food. Everything in refrigeration accessories, equipment, tools and supplies. The most complete line in the world. Distributors and Jobbers of America's finest manufacturers in refrigeration. Fast shipment from complete stock.

AIR CONDITIONING & REFRIGERATION SUPPLIES

THE HARRY ALTER COMPANY

1728 South Michigan Avenue
CHICAGO

BRANCHES
New York — Cleveland — St. Louis

be known far and wide for our initiation ceremonies.

Meeting of May 12, 1937

A letter from the National Secretary was read regarding monthly manufacturers' bulletins. In this letter was a quotation from a letter from the service manager of Frigidaire. They are willing to assist us in securing these monthly bulletins. The Secretary has written to the local Frigidaire service manager requesting a copy of the monthly bulletins as outlined in Mr. McDermott's letter. An answer to the letter from Mr. Daly of the Frigidaire Corporation was read. He stated they would send us copies of the monthly bulletins.

A letter from the Ansul Chemical Company was read. In this letter they requested that the members send in their names and addresses if they wish to receive a copy of the monthly Ansul house organ. Some sample copies of the organ were distributed.

Mr. Harry Logemann, chairman of the Examining Board, reported that his committee is making progress on test questions for the Lecture Course.

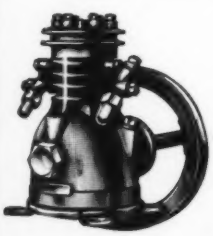
The educational feature was a talk on "Salesmanship in Service Work" by Fred Roth. This proved to be very interesting. After the talk an open forum discussion was held.

Long Beach, Calif. First Pacific Coast Chapter to Apply for National Membership

AFTER several group meetings of interested service men of Long Beach, California, and consideration of the advantages of a local chapter of the National Society, a formal petition for charter was filed with the National Secretary's office for action by a group of service men of Long Beach.

Mr. E. L. Murphy is secretary-treasurer of the new organization. The following members have applied for charter membership:

P. G. Bullington	E. F. Langston
W. R. Cope	W. D. McKnight
R. L. Darby	E. L. Murphy
A. J. Eisenbeiss	A. M. Pleshek
J. H. Engel	A. T. Riley
Ivan Franke	Lester Smith
J. H. George	Paul Sweetland



"Chieftain" Quality Built Compressors and Condensing Units

are designed to give you many years of quiet, efficient and trouble free service by Engineers who have been serving the refrigeration industry for the last fourteen years.
They have again "scored a hit" with a new "V" type four cylinder compressor which is designed for use with ½ to 1 HP motors. All of the advanced features that have proven so successful in "Chieftain" household and light commercial units are now incorporated in this new four cylinder model.
Mechanical improvements include, force feed lubrication to piston pin and connecting rod bearings, positive alignment of cylinder bores with main bearings by casting cylinders and crankcase in one piece. Adjustable suction shut-off valve, interchangeable parts with single and twin cylinder models. All compressor parts are machined to precision limits on up to date equipment and assembled in glass enclosed rooms where only filtered, dust free air is admitted.

Write for our latest descriptive catalog

TECUMSEH PRODUCTS CO., Refrigeration Division TECUMSEH, MICH.

L. S. Gould	D. H. Thompson
E. B. Gunsauls	H. M. Thompson
E. T. Hogan	Demarest Voorhis
G. L. Holmes	Louis E. Wendel

More news will be forthcoming relative to this newest chapter in future issues of THE REFRIGERATION SERVICE ENGINEER.

MEMPHIS LADIES AUXILIARY

By MRS. LOIS "HOOT" GIBSON, *Secretary-Treasurer*
333 S. Parkway, E., Memphis

GREETINGS again from the Ladies Auxiliary of Memphis, with all the social news of the past few months.

At our regular business meeting on April 13th the very much regretted resignation of our very capable secretary, Alice Geiser, was read and accepted.

Mrs. "Hoot" Gibson was nominated and elected as secretary by unanimous vote.

Mrs. Ogdon, of the Memphis Juvenile Court, attended our business meeting and gave us a very interesting talk on the charity work that could be done through the court and expressed her interest in our work.

The roll call showed a full attendance and two visitors, the following officers being present: Margaret Bridges, president; Velma Evans, vice-president; Lois Gibson, secretary-treasurer.

We have a birthday jar and every month the ladies having birthdays that month are supposed to (I am sure this will bring a laugh from the men) put in a penny for each year. But the pennies go in so fast no one has yet been able to count the number put in by any lady.

We understand there are quite a few auxiliaries being formed, and to them we extend our best wishes and hope for them all success. We want to thank "you all" for the nice compliments that have been paid us for our part in putting the Memphis convention over. We are planning a big time in Chicago.

We are still finding out, from the interest and attendance, that the "way to a man's heart is through his stomach." The donation of a nice gas stove, which completes our kitchen, from the men proves the old adage.

Our last venture in the way of entertaining was a wiener roast in Riverside Park. We still wonder what the Memphians-at-large thought of the groans and growls of the "puppies" next day.

It took Mr. Riehlmann two days to determine which he had dropped—merely the handkerchief or a piece of his back. One

MILLS
COMPRESSORS

★FOR COMMERCIAL USE

Mills Novelty Company
4100 Fullerton Ave., Chicago, Ill.

Sold Only Through Servicemen, Dealers and Distributors

lady nearly wrecked herself chasing her husband, Bill Easley, over the table.

After a pleasant and entertaining aftermath all who were able went to the home of Frank Weidlein for an impromptu housewarming in their new home on Chamblis Avenue near Whitehaven.

In addition to this hospitality Mrs. Weidlein and Mrs. Berry McAlister very charmingly entertained the Ladies Auxiliary at the social meeting of March 23rd at the Weidlein home. Mrs. Weidlein was given an appropriately chosen vase by the members as a token of good wishes.

Mrs. George Uetz was hostess at a lovely luncheon, April 27, which was most enjoyable.

When we were talking about the entertainment for the men, a fish fry was suggested and every lady agreed to eat five pounds of fish, so naturally a large order for fish was turned in, then when time came to eat the fish it was proven that the ladies' eyes were larger than their stomachs, and the poor husbands had to come to the rescue, which they were happy to do, for a maiden in distress. We are indebted to Frank Weidlein for the nice fresh fish.

If any of the service men happen to be out and have a flat, Mr. W. H. Moss will be only too glad to oblige with his *"extra."*

Why was Boyd Evans so excited and anxious to call "Many Graves?"

At the business meeting, May 4th, we planned to give a "shower" for some needy girl graduate, so at the social meeting May 26th ladies brought a nice selection of personal gifts and they were turned over to Mrs. Ogdon of the Juvenile Court to give to the most worthy girls, as she saw fit.

We would like to hear more from June Brunton. She promised to join our Auxiliary. How about the lady from Idaho? I think I have a faint recollection she promised to join us too, as there was no chapter in her home town.

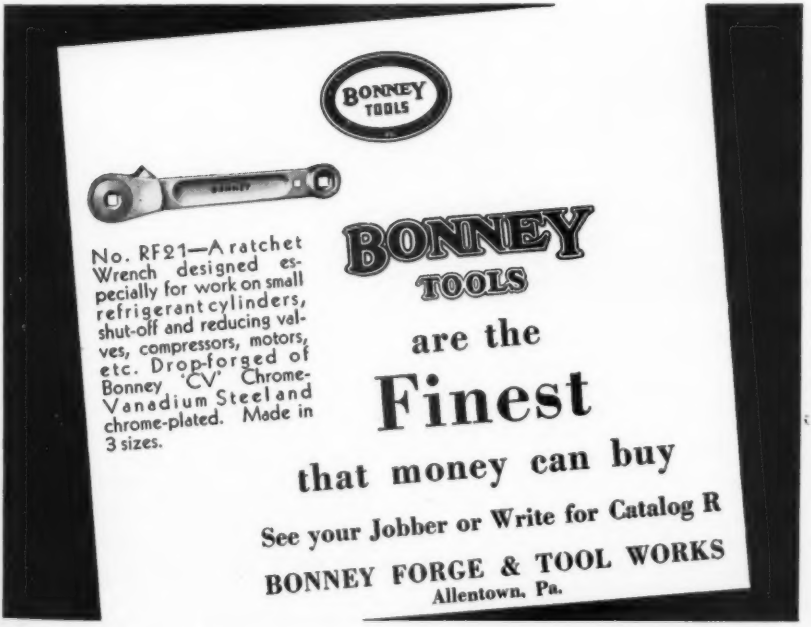
We are looking forward to the convention in Chicago.

S S S

GOOD Luck to Leonard Nelson, vice-president of Mississippi Valley Chapter, who was recently appointed service manager for the Luttrell Fixture Co., Galesburg, Ill.

S S S

HANS JENSEN, that likeable Rotary Seal representative, is enjoying the life of a country squire, having recently acquired a beautiful residence in Arlington Heights, Ill.


BONNEY TOOLS
No. RF21—A ratchet Wrench designed especially for work on small refrigerant cylinders, shut-off and reducing valves, compressors, motors, etc. Drop-forged of Bonney 'CV' Chrome-Vanadium Steel and chrome-plated. Made in 3 sizes.
BONNEY TOOLS
are the
Finest
that money can buy
See your Jobber or Write for Catalog R
BONNEY FORGE & TOOL WORKS
Allentown, Pa.

Organization and Operation of a Cabinet Service Department

This Article, While Describing the Servicing Operation of Company Department, Contains Pertinent Information for Those Interested in Ice Cream Cabinet Servicing.

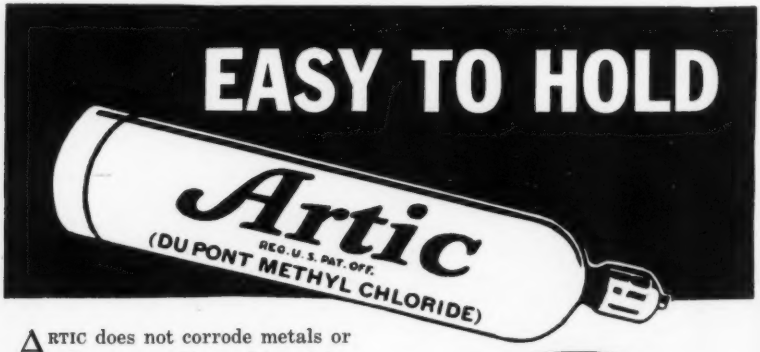
By O. F. BOYER *

ANY discussion relating to the operation and efficiency of an ice cream cabinet service department must be predicated on several factors in addition to the efficiency and ability of the service personnel. I refer to the make of cabinet used by the manufacturer, its age and condition, together with the latitude permitted the sales department in "hooking up" additional refrigerated fountains, salad cases, back bars, etc., to the ice cream compressor.

An Administrative Control Figure

We are accustomed to speak of our cabinet maintenance costs in terms of "cost per gallon." There is no accurate meaning in "cost per gallon" as applied to service department costs. The "cost per gallon" item is an administrative control figure which by its very nature represents the composite result of combined efforts and policies of the manufacturer, the sales department and the

* Ice Cream Cabinet Refrigeration Service Co., Los Angeles, Calif. Address presented before 36th Convention, International Association of Ice Cream Manufacturers.



ARTIC does not corrode metals or alloys generally used in refrigerator system construction, even if moisture is present. It operates efficiently in compact, light weight units with low power consumption. It gives controlled low temperatures down to −10° F. at POSITIVE pressures. For dependable refrigeration, specify and use ARTIC.

DU PONT
REG. U. S. PAT. OFF.

E. I. du Pont de Nemours & Co., Inc.
The R. & H. Chemicals Dept.
Wilmington, Del.
District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

ARTIC — THE PREFERRED METHYL CHLORIDE FOR THE SERVICE MAN

service department; each being interdependent upon the other and neither being able to independently control the cost of its own operation.

Let us analyze this statement:

1. The ice cream manufacturer selects the make of cabinet and compressor the service department is to install and maintain; directs the amount of money the service department may spend in reconditioning cabinets and compressors in the field and the frequency with which this work may be done; he limits the capital investment allowable in shop tools and equipment and in general sense, at least, directs salaries allowable to service men, the number to be employed and transportation facilities which are furnished.

2. The sales department in conjunction with the manufacturer, determines the extent to which the manufacturer will obligate himself to obtain the business of a dealer. The "cost per gallon" of maintaining a dealer equipped with one cabinet connected with one compressor as compared with a stop operating cabinet, back bar, salad case, and possibly a leaky fountain connected to one compressor, is as different as day is from night. This is of vital importance and we will come back to it later.

Service department costs are entirely dependent upon the make, age and condition of the equipment and the liberality which the sales department expresses to the dealer in agreeing to refrigerate various equipment in the dealer's store in addition to the ice cream cabinet itself. This apart, of course, from the ability and organization of the service personnel itself.

Now, if you check with me this far and will agree that the all important figure "cost per gallon" is an administrative and not a service problem, I can think of no better question than "So What?"

Dealer Refrigeration Service

So this! Will you, for just a moment, consider this important part of our business in relation to the plain facts. Ice cream manufacturers, large and small, from coast to coast, show less precision and more wastage in the maintenance of dealer refrigeration

EASILY SERVICED!

First, we built extraordinarily long life into this improved Sylphon Automatic Expansion Valve . . . did away with corrosion and pitting troubles with a new non-metallic valve poppet construction (see at right) . . . did away with rubber breather caps . . . made it moisture-proof. Then we made all wearing parts easily renewable, on the job. Provided a filter, ample in size, readily removed for cleaning when necessary. Isn't this the kind of trouble-free expansion valve you want?

FULTON SYLPHON COMPANY, Knoxville, Tennessee
Refrigeration Division

AUTOMATIC EXPANSION VALVE

Write for Bulletin V-5000

service than in any other operation of the business. The major responsibility, gentlemen, does not end with the signing of a desirable dealer; on the contrary, it begins there.

Let's start with the knowledge that we have promised Mr. Dealer to maintain automatically a predetermined air condition (temperature) in a cabinet or cabinets 24 hours a day, 365 days a year. It is a pretty good trick to do anything 24 hours a day, 365 days a year, but regardless, that is precisely what we agreed to do when we accepted the account. The first step then, after signing up the account, is to purchase a cabinet so engineered and constructed by the refrigeration manufacturer that it will, with reasonable attention, do this job.

Right at this point old man "cost per gallon" comes walking in but does not introduce himself. Cabinets obviously can be purchased at various prices, both new and used. The selection of the cabinet, if new, and its condition, if used, largely determines the cost of maintenance after installation. It has been my observation over a period of years that nationally distributed cabinets are the most economical. Of these, two makes predominate. Standardization on either one or both of these two cabinets simplifies the parts problem and also facilitates the employment of capable mechanics with previous experience and familiarity with the equipment. Locally built cabinets obtained at a slightly smaller original cost frequently result in excessive maintenance expense and complicate the service personnel problem.

From the standpoint of resale value in case of liquidation or replacement of old equipment, the nationally distributed cabinets, particularly the two major makes, carry a very definite resale value which is not true of the locally manufactured product.

So much for the product.

The Sales Department

The sales department, at least in so far as it is related to the cabinet service department, represents a problem the answer to which I am unable to give you. There are,

"DIDN'T KNOW IT WAS LOADED"?
Take NO chances with fumes!

HEALTH GUARD FUME KIT

There are no "mild" concentrations of refrigerants. Where there is a leak there should be a mask. This kit is designed especially for use of refrigeration servicemen. Light, compact, easy to carry. On or off with one move. Filtering cartridges for ammonia, methyl chloride and sulphur dioxide. The mask is the most comfortable to be had — and forms a perfect seal. Write for details and prices.

a CESCO Safety Product

CHICAGO EYE SHIELD CO.
2341 Warren Blvd. CHICAGO

however, certain fundamentals which should be rigidly observed. It is perfectly understandable that a salesman, after selling his product to the dealer, is not in the mood to be too dictatorial as to the equipment to be refrigerated. Particularly is this true in instances where the previous ice cream manufacturer has been refrigerating customer equipment other than the cabinet itself. However, going back to the statement previously made that after accepting an account we have to live with it, there should be rigid restrictions with respect to multiple hookups. A cabinet and compressor is not a service problem. Such service maintenance as is encountered is generally simple, the complaint well defined and readily handled by an average mechanic. When we start adding fountains, salad cases, back bars, meat boxes, bottle coolers, etc., to the ice cream compressor, we immediately graduate into an engineering problem that no average service mechanic should be expected to handle. It has been my experience that the greater portion of our expensive service and service problems originate from this type of equipment. A forty gallon fountain, for example, in one location might readily be handled on a third horsepower compressor, whereas the same type of fountain in another location, using large quantities of water, together with a back bar or two might require two or three times this capacity. When we start adding back bars where the insulation is at a minimum and service boxes with varying heat load requirements, you are simply dealing with thermal factors, which at the best, are a problem to the experienced engineer.

Multiple Hookups

Gentlemen, I cannot be emphatic enough on this question of multiple hook-ups and can only say to you again that from my observation and experience in this business, I would say without qualification that the nearer you stay to the installation of one cabinet on one compressor, the closer you will come to not only properly serving your customer, but reducing your "cost per gallon" to a point where you can live with it. For those of you who will still continue to

USE THE ZENITH REFRIGERANT FILTER

. . . FOR SULPHUR DIOXIDE, FREON OR METHYL CHLORIDE REFRIGERATORS

BECAUSE Zenith elements provide finer spacings (.002") than any asbestos sack or wire screen filter.

Easily installed—Easily cleaned
Permanent Protection
No Wool or Asbestos to Rot and Wear Out
Corrosion Proof—Leak Proof
Ample Capacity

Positive protection against dirt in Expansion Valves, Solenoid Valves, Capillary Tubes and other liquid control devices.

ZENITH CARBURETOR COMPANY
Subsidiary Bendix Aviation Corp.
DETROIT, MICHIGAN

Engineered Refrigerant Filters in a variety of sizes for varying capacities.

believe the salesman when he says he has to hook up other equipment with the ice cream compressor, let me give you this general engineering rule—"two-thirds of the total heat load must be on the low temperature side," in other words, a twelve hole cabinet and a small back bar coil in engineering parlance is not entirely unacceptable, but a two hole cabinet and a large reach-in box is just impossible. Individual compressors for back bars, service boxes, etc., is the only sound procedure if the sales department insists on furnishing refrigeration in addition to the ice cream cabinet or fountain.

One last comment with respect to the sales department. First, do not promise more than you can reasonably deliver and, second, ask the salesmen not to be too ready on every complaint of the customer to "send a man out." You would be surprised at the number of service calls which are unnecessary. So much for the sales department.

The Service Department

With respect to the service department itself, there is not much more to be said than you already know. Mechanics, of course, should be selected on the basis of their familiarity with the equipment and their ability to analyze trouble. Repairing the trouble is comparatively simple if it is accurately analyzed as to its source. Carbon conditions, plugged screens, etc., are always due to air in the system, so just tell your service men that while pressures assist in forming carbon, if the job has been entirely free from air, it would not be there. Neatness in appearance and a courteous approach to the customer is obviously important. I believe most of our manufacturers these days equip their men with uniforms which are laundered daily. I am personally very favorable to a neat cap. It adds dignity to the man, particularly to those fellows who do not like to comb their hair.

In metropolitan centers we have found the district plan of servicing to be very successful; that is, dividing the city into districts, each man being responsible for the maintenance and service of the equipment in his

COUPON

SNAP-ON TOOLS, INC.
Kenosha, Wis.

( ) Send FREE literature.

( ) Show me Snap-on Tube Cutter No 27.

Name .....

Address .....

..... RSE-6

Snap-on

SPECIALIZED TOOLS FOR REFRIGERATION SERVICE

● End tube cutting troubles with a Blue Point Tube Cutter. Cuts brass, copper, bronze and similar tubing from ⅛" to 1" diameter. Steel cutter wheel makes cuts clean through entire tube — you don't have to wrestle tube apart. The "V" blade reams burrs from inside of the tube. Cutter wheels are easily replaced at nominal cost.

Available only through our own branch distributing warehouses located in 37 principal cities. See "Snap-on Tools, Inc.," in your telephone directory or send coupon.

SNAP-ON TOOLS, INC.
Kenosha, Wis.

district, under the direction of a central dispatcher.

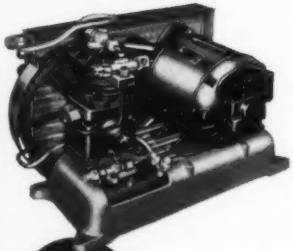
Cabinets and Compressors

We have covered briefly the three major factors affecting the operation of a cabinet service department. Let us look now at some of the generalities affecting maintenance of cabinets—in other words, cabinets and compressors. First, the age of the cabinet. It has been my experience, and this observation is based on performance of two leading national makes, that very little service maintenance is encountered the first year. Immediately after the installation we sometimes have several temperature adjustments, but once adjusted there is really no problem for the succeeding twelve months. During the second year, you can expect to have a float valve change, a temperature setting, and in the case of direct expansion cabinets, possibly an adjustment or two of the valve. During the third year somewhat the same experience can be expected, with possibly a new belt. During the fourth and fifth years is where trouble really commences. This is the time when the compressor itself will need attention and the cabinet also and it is my experience that beginning with the fourth or not later than the fifth year of operation, the compressor should have a complete overhaul and the cabinet likewise. After a complete overhaul, it is reasonable to expect another cycle of service similar to that of a new cabinet. It is not unreasonable to expect another five year service cycle from a properly overhauled job. After the tenth year you can use your own judgment; our ice cream cabinet industry being just about that age at the present time, we have no precedent.

Regular Cabinet Inspection

One of the questions most frequently asked, is "Should regular inspection of cabinets reduce maintenance cost?" I do not hesitate to answer this question in the affirmative. It certainly does. It would be my recommendation that all cabinets be inspected at least four times a year. By inspection I mean to check the cabinet as to temperature with gauges on both high and low side, check the belt, oil the motor, clean

for Service Replacement & New Installations



M & E Bare Compressors and complete units, available with or without motors and controls, meet every need of the Assembler or Service Company with high quality, moderately priced.

One, two and four cylinder models for SO_2, CH_3CL and F-12. 1/6 h.p. to 20 h.p.

Write for new catalog — a valuable reference.

M&E EST. 1866

MERCHANT & EVANS COMPANY
Philadelphia, Pa., U. S. A., Plant at Lancaster, Pa.

READY NOW! . . . . .

Are *YOU* on Our Mailing List?

Nationally Known Lines at LOWEST WHOLESALE PRICES!

Send request on your business letterhead today! Wholesale to the trade only.

BURSTEIN-APPLEBEE CO.
1012-14 McGee
Kansas City . . . . Mo.

NEW REFRIGERATION PARTS CATALOGUE

All standard makes of refrigeration parts

Write for your copy

Wholesale Only

REFRIGERATION PRODUCTS, Inc.
122 W. Illinois St., CHICAGO, ILL.

the condenser by blowing with air, clean the compressor and motor with solvents, touch up rust spots on the cabinet panels, etc. It is well known in the motor industry that electric motors furnished up until the first of this year were not adequate for refrigeration duty. Therefore, it would seem advisable to use every precaution possible to keep the motors clean, well oiled and as free from dust and dirt as possible. Considerable motor trouble can be eliminated by this procedure.

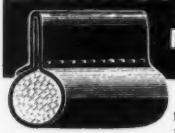
With relation to inspections I do not believe that monthly inspections prove profitable. Inspections four times a year provide all the protection it is possible to give in the field. The distinction here is simply that only a limited amount of work can be done in the dealer's place of business. When equipment reaches a point where it is inefficient or troublesome, it should be brought into the shop where a complete overhaul can be done systematically and with the proper facilities. Inspections every day could not entirely eliminate this type of repair.

Small and Large Cabinets

We have been asked for figures as to the cost of servicing small dealers as compared with larger dealers. There are no figures available as to the "cost per gallon" on this comparison. It is perfectly obvious that the "cost per gallon" on a twelve hole stop is going to be considerably less than the "cost per gallon" on a two hole. From the standpoint of maintenance there is absolutely no difference in service costs. In other words—a twelve-hole cabinet can be serviced and maintained at exactly the same cost as a two hole. In depreciating the equipment and in original investment costs there would be a proportionate difference, of course.

The only justification that I can see for very small stops is where they occur on a regular route and can be served at a minimum of expense, or where an ice cream cabinet is furnished to protect a profitable milk stop.

DENNIS GASKETS
FOR ALL MAKES REFRIGERATOR DOORS



A complete line of rubber - coated, packed Gaskets and extruded rubber Gaskets that last longer —retain higher efficiency—because made of finest materials and workmanship. Write for free samples, giving your jobber's name and address.

W. J. DENNIS & CO.
2110-20 WEST LAKE ST. — CHICAGO

KRAMER COIL PRODUCTS
—A Complete Line
Send for Catalog
TRENTON AUTO RADIATOR WORKS
TRENTON, N. J.
Kramer Auto Radiator Corp. New York, N. Y.
Kramer Auto Radiator Co. Pittsburgh, Pa.

SAME DAY SERVICE

A COMPLETE LINE OF STANDARD MAKES OF REFRIGERATION AND AIR CONDITIONING PARTS CARRIED IN STOCK AT ALL TIMES

Write for our new catalog — parts — supplies — tools — equipment — wholesale only

H. W. BLYTHE COMPANY

2334-38 South Michigan Ave. CHICAGO, ILLINOIS

Cost of Service Maintenance

You have for years had average service costs per gallon. The latest figures available from our own territory show the average cost per gallon for service maintenance only to be five cents. Anything below five cents is better than average performance. Cost per gallon for the entire operation of the service department, including installation, removal, maintenance and depreciation on cabinets, should be eight cents. Below this figure is better than average performance.

A fair average cost per compressor, per month, for maintenance only is $1.50. This figure, of course, will vary depending on the location of the stops and the number of multiplexed evaporators and cabinets connected to the compressor. From $1.25 to $2.00 per compressor is average performance, the allowable variation being contingent upon the average number of evaporators connected to one compressor and locations of installations.

Distribution of Service Costs

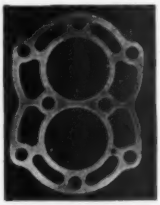
Just a word concerning the distribution of service costs. Your records should reflect accurately the cost of maintenance only, cost of rebuilding, cost of installation and removals, depreciation of equipment and then the total cost. Each of these operations has its own classification and should be so considered in the cost breakdown. Cost of compressor and cabinet overhaul should be credited to the book value of the equipment as a capital expense rather than maintenance.

Installations and removals are sales department items. Some manufacturers consider it good business to charge to the sales department, maintenance of all evaporators, etc., not directly concerned with refrigeration of ice cream.

The Service Man—A Physician

Service, at its best, is a difficult business. I like to have our service men think of themselves in the terms of a physician; and the customer, the patient. The first thought of a good physician in talking to his patient, is to place the patient completely at ease. If our service men, in making their calls,

REPLACEMENT GASKETS FOR ALL MAKES



Metallic Gaskets that hold regardless of what the refrigerant may be and will not shed particles of material to clog up important working parts in a machine.

Send for catalog listing many "orphans" not available elsewhere.

CHICAGO-WILCOX MFG. CO.
7701 S. AVALON AVE., CHICAGO, ILL.

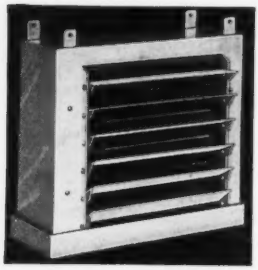
Shop Practice Included

Nothing has been overlooked to make U. E. I. training thorough and practical in every respect. Following the spare time home study that gives the principles of refrigeration and their practical application to ALL TYPES of equipment, U. E. I. men get two weeks of actual servicing and installing experience on all types of household and commercial refrigerating equipment.

U. E. I. trained men are fully trained. Some are available NOW.

Utilities Engineering Institute

404 N. Wells Street, Chicago
17 W. 60th Street, New York



UNIT BLOWERS
Pipe Coils
Air-Conditioning Coils
FIN COILS
5/8" - 3/4" - 1"
Steel or Copper
REMPE COMPANY
340 N. Sacramento Blvd. • Chicago, Illinois

REMPE

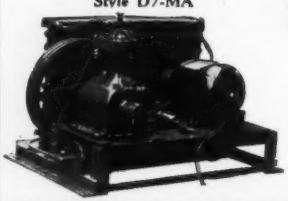
would consider themselves as the doctor and endeavor, first of all, before attempting to make any repairs, to place the customer mentally at ease, it would assist materially in finding the trouble and applying the remedy.

Many service calls are fancied—others exaggerated in the customers' minds. Permit me, in concluding, to illustrate this with an experience we had in the early days of refrigeration:

At this time, one of the power companies in the South decided that the successful way to merchandise electrical refrigeration was by rendering perfect service and, in line with this thought, employed a staff of technical school graduates as service men and then trained them in the particular refrigerator they were handling. At the conclusion of the training course, competitive examinations were held in which one man was outstanding—in fact, his examination paper showed a rating of 99%. About this same time, the service department had been receiving repeated calls from a school mar'm to whom they had sold a refrigerator. The general manager of the company, in view of the repeated calls, decided to send out their "star" man who had passed his examination with the 99% mark, feeling sure he could remedy the trouble once and for all. This he proceeded to do and the man reported back that everything was working satisfactorily.

Next day the telephone rang and again the school mar'm on the phone: "My refrigerator is not working." The general manager replied, "Madam, there is positively nothing more that we can do for you. We have sent every service man we have—in fact, the last man is our 'star' man and in our competitive examination, passed with a mark of 99%. I don't know what else we can do." The school mar'm raised her voice and said, "What was that you said?" He replied, "The last man we sent you was our very best man, the man who passed his examination here with a mark of 99%." Quickly the school mar'm shouted, "I thought so—I thought so! That is just it. That one thing that he missed is what is wrong with my refrigerator."

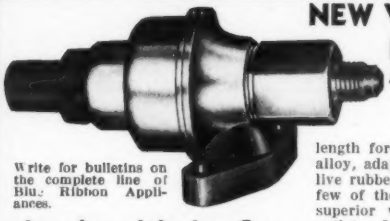
Condensing Unit
Style D7-MA



STARR FREEZE
DEPENDABLE COMPRESSORS AND CONDENSING UNITS
1-2-4 Cylinders—1/8 to 10 H.P.
The most profitable and complete line to select from—just the size to build that refrigerator,—to assemble that condensing unit or to replace that old worn-out compressor.

Compressor Style J

THE STARR COMPANY, Richmond, Ind., U. S. A.
222 N. Vermont Ave. Los Angeles, Calif.
2025—1st Ave. North Birmingham, Ala.
1222 Huron Road Cleveland, Ohio



Write for bulletins on the complete line of Blu-Ribbon Appliances.

American Injector Co.
1481 14th St. Detroit, Mich.

NEW VALVES . . Small in Size
Big in Performance *Type "F"*
AUTOMATIC EXPANSION VALVES

These valves are especially designed for the smaller units. Bodies are hot pressed die forgings, close grained and non-porous. The springs are extra length for smooth, velvety adjustments. Needles are special alloy, adaptable for any refrigerants. The breather cap is of live rubber with threaded metal insert. And these are just a few of the many outstanding construction features of these superior valves. No. 1582, ¼" S.A.E. inlet—¼" F.P.T. outlet. No. 1583, ¼" S.A.E. inlet — 1¾" bolt centers. Type "F" valves are interchangeable with all refrigerants except ammonia.

New Catalogs

AT this season of the year, new catalogs are making their appearance on the editor's desk regularly. Each season's catalogs indicate numerous additions and improvements, all designed to provide information for the serviceman conveniently and comprehensively. Because of the wealth of information contained in these catalogs, it is to the interest of every serviceman to see that his catalog file contains the latest releases from the various manufacturers and jobbers. Catalogs recently published include the following:

REMPE CO., 340 N. SACRAMENTO BLVD., CHICAGO, ILL. Bulletin and Price List No. 102 is a convenient arrangement of engineering data and prices on Rempe unit blowers for walk-in coolers, low temperature work and comfort cooling.

BURSTEIN-APPLEBEE CO., 1012-14 McGEE ST., KANSAS CITY, MO. Wholesale Buyer's Guide No. 53, which supplements Catalog No. 52, on refrigeration, electrical equipment and radio. Contains 130 pages, with approximately 50 pages devoted to refrigeration equipment of leading manufacturers.

AIRO SUPPLY CO., 2732 N. ASHLAND AVE., CHICAGO, ILL., has released Wholesale Catalog No. 37A for the air conditioning and refrigeration trade. The new catalog, 8⅛"x10⅝" in size, contains 86 pages of nationally-known quality merchandise. The new catalog adds many well-known lines to the now large Airo stock. Such items as Copeland condensing units, Kay and Ess refrigeration lacquers and paints, Peerless evaporators and controls, Methylene Chloride for Grunow, porcelain refrigerator accessories and Ranco commercial controls have been added to the Airo line, and are now carried in stock.

AMERICAN BRASS CO.—AMERICAN METAL HOSE BRANCH — WATERBURY, CONN. An attractive 16-page catalog of seamless flexible tubing, illustrating the many uses for which this tubing is used. Of particular interest to the refrigeration engineer are the description and illustrations of vibration eliminators made of this tubing.

PARTS-SUPPLIES-TOOLS
for REFRIGERATION-AIR CONDITIONING

Complete Stock—Quick Service

One-day service on your order for any parts, supplies or tools you may need for any type of refrigerator or air conditioner. QUALITY MERCHANDISE, absolutely guaranteed and offered at the lowest prices. Deal with us—obtain all your needs from one source—and rely absolutely on getting exactly what you order. WHOLESALE ONLY for your protection. Request big, complete, new catalog on your business card or letterhead. It's FREE.

AIRO SUPPLY CO. 2732 N. Ashland Ave., Chicago
17 W. 60th St., New York

ALL YOUR NEEDS FROM ONE SOURCE

SEND FOR BIG FREE CATALOG

Also illustrated were pointers on detaching and re-attaching American Detachable Fittings.

H. CHANNON CO., 133 N. WACKER DRIVE, CHICAGO. Catalog No. 11, containing 126 pages, is replete with information on refrigeration and air conditioning supplies, covering practically all of the well-known manufacturers' lines. Included in this latest catalog is the announcement of H. Channon Co. as authorized distributors for genuine Kelvinator parts.

THERMAL CO., INC., 2490 UNIVERSITY AVE., ST. PAUL, MINN. Catalog No. 2, listing the refrigeration and air conditioning products of numerous leading manufacturers. The Milwaukee office, located at 925 W. Wells St., Milwaukee, Wisc., was recently opened by the company and is in charge of Mr. Clarence E. Hamilton, of Chicago.

HARRY ALTER CO., INC., 1728 S. MICHIGAN AVE., CHICAGO, ILL. Dependabook Catalog 119. June 1937. 114 pages. This new catalog is filled with practically every item employed in refrigeration work. The lines of the leading manufacturers are fully described and illustrated.

Servicemen's Catalog

The Expert Refrigeration Service Catalog, designed by the Harry Alter Co., is strictly a catalog for the serviceman. The service organization, or individual's name, appears on the front cover, immediately identifying the catalog as that of the dealer's name. No other name appears anywhere in the catalog. Two pages of suggestions and information

OUR "SILENT SALESMAN"
EXPERT
REFRIGERATION SERVICE
WE REPAIR AND SERVICE ALL MAKES
• ALL WORK DONE BY TRAINED MEN AND FULLY GUARANTEED.....
• WE MAINTAIN MULTIPLEX, COMMERCIAL and AIR CONDITIONING.....
This Book contains VALUABLE HINTS FOR BEST RESULTS FROM ELECTRIC REFRIGERATION
DEALER'S NAME
ADDRESS HERE

● WRITE for details on this new 9" x 3' Workshop Precision Lathe — back geared, screw cutting. Made in 8 different drives, 4 bed lengths. 38 practical attachments available for use with this lathe. Weight 320 lbs. crated.

Ask for catalog 15K—sent Free, Postpaid.

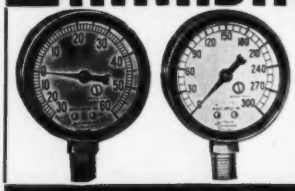
SOUTH BEND LATHE WORKS
812 E. Madison St., South Bend, Indiana, U. S. A.

General Electric, Westinghouse, Majestic, Gibson-Hermetic Units Rebuilt or Repaired

Complete MACHINE SHOP SERVICE on all makes of both domestic and commercial units. All units completely tested and guaranteed. Write for our latest price list.

ALLIED REFRIGERATION PRODUCTS CO.
1947 Flushing Avenue — Brooklyn, New York

MARSH *Refrigeration Instruments*



MARSH REFRIGERATION Gauges are available in all types and for all applications including sulphur dioxide, methyl chloride, Freon, carbon dioxide, ammonia, etc. These instruments are ruggedly built and are particularly adaptable for service in the factory, testing laboratory or out in the field. When so ordered Marsh refrigeration gauges can be supplied with Marsh Recalibrator (Patent Pending) assuring perfect accuracy for the life of the instrument.

JAS. P. MARSH CORPORATION
2059 SOUTHPORT AVENUE, CHICAGO

WRITE FOR NEW CATALOG

on electric refrigeration precede the 20 pages of illustrated parts and equipment used in repairing domestic and commercial units, all at retail prices. Other suggestions for improving refrigeration equipment are illustrated. The catalogs are purchased by the serviceman, with or without imprint, at a very nominal cost.

H. GOLDBERG CO. APPOINTED RANCO DISTRIBUTORS

THE H. Goldberg Co., manufacturers representatives, 9 S. Clinton St., Chicago, has been recently appointed distributors for Ranco controls for the metropolitan Chicago and middle west territory.

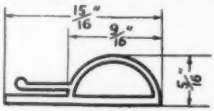
LANGSENKAMP OPENS PARTS STORE AT SOUTH BEND

F. H. LANGSENKAMP CO., with main offices at 229 E. South St., Indianapolis, Ind., on May 7 opened a new warehouse at South Bend, Ind., to further serve the refrigeration field in that territory. The South Bend store is located at 127 S. St. Joseph St., and is in charge of Mr. Byron Hathaway.

Langsenkamp have established themselves

SOUTH BEND STORE OF LANGSENKAMP.

REFRIGERATOR DOOR GASKETS



The gasket illustrated was made especially for Rex cabinets and fits the older models of Apex, Crosley, Stewart-Warner, and Trupar. All JARROW gaskets are built to manufacturer's specifications.

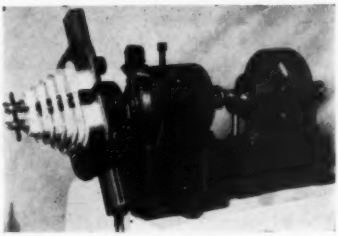
646 *Insist on Jarrow replacement.*

JARROW PRODUCTS CORPORATION
420 N. LaSalle St., Chicago, Ill.

Designed Especially for Making REFRIGERATOR MOTOR COILS

Ideal Coil Winder

Speedy—Adjustable to Many Sizes



Ideal Concentric Coil Winding Head mounted on Ideal Coil Winder Drive, showing group of coils wound in series and tied ready for inserting into motor.

One Ideal Coil Winder takes place of many separate, expensive, bulky wooden forms. Does speedier, better job. Mechanically precise wire tension maintained at all times. Wires in each set of coils are wound parallel, to correct shape, all ready for insertion direct into motor. Only two ends of wire to be soldered when set of coils is completed. From winding head to stator in one move! *Write for free trial offer*

Ideal Commutator Dresser Company
1093 Park Avenue Sycamore, Illinois

THE TURNER HALIDE DETECTOR

FINDS LEAKS

QUICKLY—SURELY—SAFELY

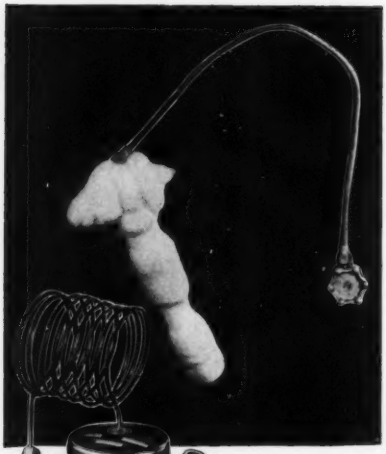
No. H-15

Regardless of what other methods you may have employed in detecting leaks of chlorinated Hydro carbon refrigerants, you can do it better with a Turner Halide Detector. Made in 2 sizes from which to choose.
H-1—List Price.....$7.50 complete
H-15—List Price..... 3.30 complete
No gadgets to buy—uses alcohol for fuel.
Carried in stock by leading supply jobbers throughout the country.
Write for Circular

THE TURNER BRASS WORKS
SYCAMORE, ILL.

No. H-1

Encased in Ice..



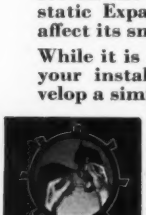
Unretouched photo from laboratory showing A-P Thermostatic Expansion Valve operating perfectly even though encased in ice.

Thermostatic Expansion Valve No. 205 ½ to 2 ton Freon.

Everyday, in the laboratory, A-P Expansion Valves are subjected to adverse condition tests, just to be sure that they will never fail you regardless of the conditions.

Ice on the body of A-P Thermostatic Expansion Valve does not affect its smooth, positive action.

While it is not likely that any of your installations will ever develop a similar condition—still it is a safe feeling for you to know that A-P Valves will operate perfectly under it.



PROGRESSIVE JOBBERS EVERYWHERE STOCK CONTROLS.

AUTOMATIC PRODUCTS COMPANY

7454 NORTH THIRTY-SECOND STREET

MILWAUKEE WISCONSIN

as complete suppliers of refrigeration accessories for central Indiana, and this additional store will serve to further increase their service.

Mr. Henry Dekker has been added to the staff at the headquarters store in Indianapolis, which will give the Langsenkamp Company a well-rounded sales and engineering organization.

S S S

HARRY ALTER COMPANY CLEVELAND OFFICE

LOCATED on one of the principal thoroughfares of Cleveland, at 4506 Prospect Ave., and conveniently situated to all parts of the city, is the wholesale store of the Harry Alter Company. This branch,

nearly one year old, has been established in keeping with the Alter policy to provide distributing stations at strategic points and to render a personal service for the requirements of the refrigeration and air conditioning industry.

In charge of the Cleveland branch is Mr. Henry Spivak, formerly of the South Side Chicago branch of the company. Mr. Spivak is active in his desire to serve the refrigeration industry, and in the advancement of the R.S.E.S.

S S S

RECORDING INSTRUMENT FOLDER

A NEW folder describing portable recording thermometers and electrical operation recorders has been issued by Practical Instrument Company, 2717 N. Ashland, Chicago. The instruments are used in the refrigeration, air-conditioning and heating industries. Net prices are $18.00 for thermometers and $21.00 for operation recorders. The instruments are distributed through jobbers of refrigeration, heating, florist and industrial supplies.

REMPE COMPANY ELECTS OFFICERS

ACCORDING to an announcement by Mr. G. A. Rempe, at a recent meeting of the Board of Directors of the Rempe Company, the following officers were elected: George A. Rempe, President; Lester Rempe, Vice-President and Treasurer and C. Rempe Denver, Secretary.

Mr. J. O. Schultz, formerly of the Brunswick-Kroeschell Co. of Chicago and the Triumph Ice Machine Co. of Cincinnati, was appointed General Manager in Charge of Sales. Mr. George T. White was made General Superintendent in Charge of Production.

* * *

J. D. McLEOD, VICE-PRESIDENT OF COPELAND

AS a further step in the progress of the Copeland Refrigeration Corporation, which is undertaking an expansion of its national distributing organization, President Dallas E. Winslow today announced the appointment of J. D. McLeod as vice-president and general manager.

Mr. McLeod came to Copeland as general sales manager last December from the Chevrolet Motor Company where, over a period of fourteen years, he served as special representative, regional sales promotion manager, city sales manager for Detroit and zone manager at Flint.

* * *

CHANNON CATALOGUE

THE H. Channon Company has just recently issued their new Refrigeration, Air Conditioning and Heating catalogue No. 11.

The Refrigeration line is very complete, the listing of practically all repair parts. From time to time, new lines, we are told, will be added in an effort to keep abreast of changing conditions. The Kelvinator service repair parts line, we are told, has been recently added and is now in stock and available to the dealer.

In Air Conditioning items, the catalogue is complete, including such items as compressors, coils, cooling equipment, controls, installation materials; also fans, blowers, duck turns, grills and registers.

The heating line follows with a large and complete listing of controls and installation materials.

The entire catalogue is numerically arranged to insure easy access to and availability of the various lines.

WORLD-WIDE DISTRIBUTION

From 82 Points Speeds Deliveries

From 82 strategically located distributing points, ESOTOO and V-METH-L, the famous refrigerants, are rushed to you by every means known to modern science. Pure, reliably uniform, and dry as the highest technical skill can make them, it is no wonder that these quality products are the choice of an increasing number of experts in the refrigerating service field.

EXTRA DRY ESOTOO *and* V-METH-L

PRODUCTS OF VIRGINIA SMELTING CO.

WEST NORFOLK, VA.

Index to Advertisements

Airo Supply Co. 77
Alco Valve Co. 2
Allied Refrigeration Products Co. 78
Alter Co., The Harry 64
American Brass Co. 3
American Injector Co. 77
Ansul Chemical Co. 55
Automatic Products Co. 80

Blythe Co., H. W. 75
Bonney Forge & Tool Wks. 67
Burstein-Applebee Co. 74

Channon Co., H. 62
Chicago Eye Shield Co. 70
Chicago-Wilcox Mfg. Co. 75
Copeland Refrigeration Corp. 00
Cutler-Hammer, Inc. ..... Inside Back Cover

Dennis & Co., W. J. 74
Detroit Lubricator Co. 8

Electrimatic Corp., The 60

Fedders Manufacturing Co. ..... 42 and 43
Fulton Sylphon Co. 69

Gilmer Co., L. H. 00

Henry Valve Co. 83

Ideal Commutator Dresser Co. 79
Imperial Brass Manufacturing Co. 63

Jarrow Products Corp. 79

Kelvinator Div. of Nash-Kelvinator Corp. 5
Kerotest Manufacturing Co. 4

Linde Air Products Co., The 44

Manufacturers Fin Coil Co. 58
Marsh Corp., James P. 78
Merchant & Evans Co. 73
Miller Rubber Co. 82
Mills Novelty Co. 66
Minneapolis-Honeywell Regulator Co. ..... Back Cover

National Refrigeration Supply Jobbers' Assn. 59

Peerless of America, Inc. 61
Practical Instrument Co. 00

Ranco, Inc. 6
R. & H. Chemicals Dept. 68
Refrigeration Products, Inc. 74
Rempe Co. 76
Rotary Seal Co. ..... Inside Front Cover

Shank Co., Cyrus 58
Snap-On Tools, Inc. 72
South Bend Lathe Wks. 78
Starr Co., The 76

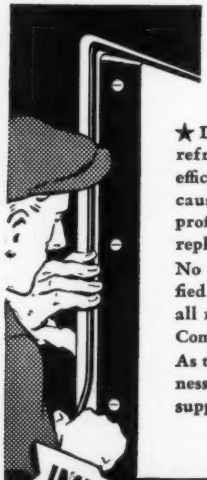
Tecumseh Products Co. 65
Trenton Auto Radiator Works 74
Turner Brass Wks. 79

Union Carbon & Carbide Corp. 44
Utilities Engineering Institute 75

Virginia Smelting Co. 81

Weatherhead Co. 41
Wolverine Tube Co. 1

Zenith Carburetor Co. 71
Zerozone Refrigeration Co. 00



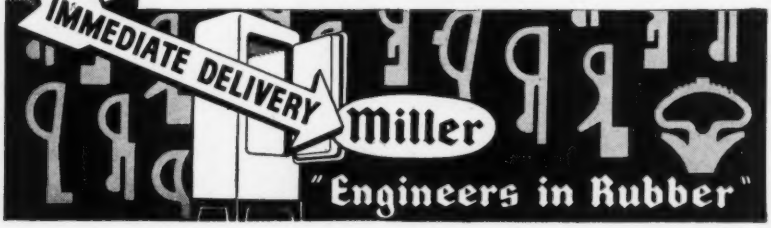
Don't Close the Door to EXTRA PROFITS

★ Don't forget to check the door gaskets when you service a refrigerator—particularly if it is five years or more old. The efficiency of thousands of refrigerators is threatened, today, because of time-worn gaskets. If you are on the lookout for extra profits, now is the time to capitalize on this new and ever-growing replacement business.

No costly equipment or material stocks are required. The simplified Miller line of 20 gasket types enables you to service 80% of all refrigerators ever made. Order them according to your needs. Complete warehouse stock insures immediate delivery.

As the first step towards getting your share of this profitable business, send for illustrated price list. If your local jobber cannot supply you, write direct.

THE MILLER RUBBER COMPANY, INC.
Akron, Ohio



Approved by THE INDUSTRY

● Henry Dryers, Strainers and Large Valves today hold the position of undisputed leadership in refrigeration and air conditioning. Their progress has been marked by a steady, consistent growth in customer appreciation. . . . Service men, contractors, manufacturers and jobbers have found through actual experience that Henry Leadership carries with it the assurance of sounder engineering, design that more aptly meets the various conditions encountered in field service and value which is measured, not only in first cost, but also in greater convenience and longer life. . . . To those who now use Henry Products, we pledge a continuation of those same policies which have made our growth so sound. . . . To those concerns who have not as yet standardized on Henry, we invite a careful comparison with competitive products, confident that their good judgment will result in their joining our ever growing circle of satisfied customers.

●

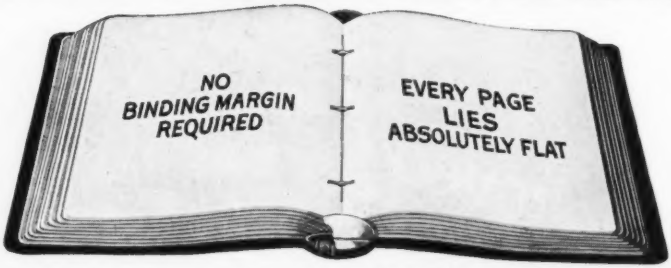
MOST COMPLETE LINE OF DRYERS, STRAINERS AND LARGE VALVES

HENRY VALVE CO.

1005-17 NORTH SPAULDING AVENUE · CHICAGO ILLINOIS

BIND—your copies of
THE REFRIGERATION SERVICE ENGINEER
for Future Reference

ALL COPIES ARE PUNCHED TO FIT THIS BINDER



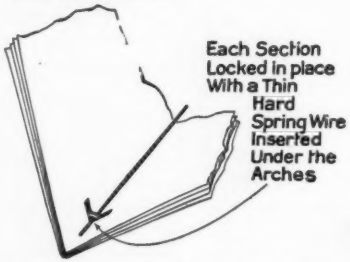
Every issue of this magazine will have valuable information which you will want to retain for future reference.

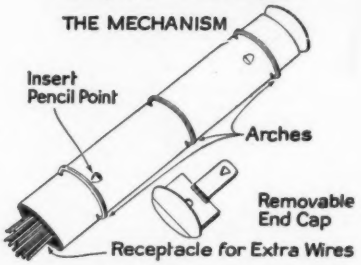
Here is a handy, substantial binder that permits you to add each copy readily as it is received. The binder is so constructed that regardless of the number of issues, every page lies flat and is easily read.

Holds twelve issues—an entire year's supply. No hunting around for lost or missing issues. The entire year's edition is always handy.

The name of the magazine is attractively stamped on the cover in gold.

HOLDS TWELVE COPIES
Only $1.25 Postpaid





It's simple — here is how it works

Each issue is locked in place with spring wire. It takes only an instant to add an issue. Reserve supply of extra wires for future issues is kept in the back-bone of the binder. File your copies promptly as received.

Send Your Remittance of $1.25 to

THE REFRIGERATION SERVICE ENGINEER
433 NORTH WALLER AVE. CHICAGO, ILL.

IS IT SAFE FOR THE SERVICE MAN TO DO *Anything Else?*

● Any service man who has been over the ground knows that more and more of the leading refrigerator manufacturers are *standardizing* on Cutler-Hammer Refrigerator Control. This fact is doubly important to the man who knows what thorough and exhaustive tests precede such a decision.

And every service man who is trying to establish himself soundly with his customers knows that what is best for the box *must* be best for him. That is why more and more service men standardize on the *same* control . . . Cutler-Hammer Control . . . for replacement service. *It's the only control that gives them the proven features of C-H Design.* Write for literature. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1363 St. Paul Ave., Milwaukee, Wis.

Check These Outstanding Features of C-H Refrigeration Control

- ✓ 4 models meet nearly every need
- ✓ Famous C-H overload protection now available for replacement control
- ✓ C-H settings are *dependable;* stay the way you set them for years
- ✓ All wanted advantages: cold control; defrost position; adjustable temperature and pressure range; each model fits large or small openings; mounts horizontally or vertically; simple connections.

CUTLER-HAMMER
REPLACEMENT CONTROL
C-H

NEW DESIGN
NEW FEATURES
NEW LOW PRICES

OUTWARDLY Minneapolis-Honeywell Refrigeration Controls are changed instruments. But it's the inside that really counts. Ratings have been increased and differentials made closer. Visible scales are now mounted behind a glass panel which effectively seals the mechanism against dust particles, insects and other foreign matter. Minneapolis-Honeywell Refrigeration Controls will prove their superiority. Yet they are available at new low prices. Complete information and data is now ready. Write for it. Minneapolis-Honeywell Regulator Co. 2951 Fourth Ave. So., Minneapolis, Minn.

Dependable Controls Cost Less Than Ser

AUTOMATIC CONTROLS MH

MINNEAPOLIS-HONEYWELL

Control Systems

BROWN INDUSTRIAL INSTRUMENTS NATIONAL PNEUMATIC CONTRO